


- A

 JUNIOR GEOGRAPHY

OF

THE BRITISH ISLES

By the Same Author.

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A
JUNIOR GEOGRAPHY
OF
THE BRITISH ISLES

BY
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CENTRAL HIGH SCHOOL FOR BOYS, MANCHESTER

WITH MAPS AND DIAGRAMS

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COLLINS CLEAR TYPE PRESS

PREFACE.

This series of text-books, drawn up on ^{modern} lines, gives a complete course of the Geography of the World, physical phenomena being carefully treated, so that pupils who pass through the lower and intermediate forms will possess a sound knowledge of all the continents. Upper forms, as a rule, prepare for professional examinations, and, in their case, a more complete training in detail is necessary. The information given in the text is founded upon the structure of each country treated, special stress being laid upon the interdependence existing between various nations. Humanistic Geography is treated as the result of structural and climatic effects.

Diagrams have been drawn wherever they could be helpful, and in most cases a separate figure is devoted to each particular point of interest. These are not intended to replace the atlas, but rather to accentuate the necessity for its use. Names have not been used too freely, and long lists and figures have been avoided.

The series includes:

Book I.—THE BRITISH ISLES, and simple geographical principles.

Book II.—EURASIA, excluding the British Isles.

Book III.—AMERICA. AFRICA. AUSTRALASIA.

Preface.

This plan has been adopted because it is logical and has been found successful in practice. Asia is taken in Book II. before America: first, because its features are related to those of Europe, and secondly, because it shows every climatic effect found between the Equator and the Polar seas. Book III. uses North America to carry the lessons of Book II. to the other side of the globe; while the similarity between North and South America is used to complete the *story of the earth* in the southern hemisphere.

My thanks are especially due to the publishers for the care taken in the reproduction of the diagrams and for the clearness of the type used. This latter point is not the least valuable for young students.

The responsibility for all errors lies with the author.

T. W. F. PARKINSON.

CENTRAL HIGH SCHOOL FOR BOYS
MANCHESTER

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Part I.

ELEMENTARY GEOGRAPHICAL PRINCIPLES

MAPS AND PLANS.

Looking through the window of a school or of a house, we get a view of some part of the earth. It may be part of a town with its streets and buildings, or part of the country with its hills and trees and fields, or a part of the sky and sea may be included. The extent of this view will be determined by the frame of the window. Every window will present a different view, but each view will possess one fault, namely, the more distant parts will appear smaller and less distinct than those which are nearer.

Railway or tramway lines show this very clearly (See Fig. I)

It would be quite possible to paint these views, or even to photograph them, but the result would not give the true relation of the parts to one another. However, photographs of different parts of the world greatly aid us in the study of Geography.

To obtain the true size and relationship between the different parts, plans and maps are used. A plan may be regarded as a map of a small area.

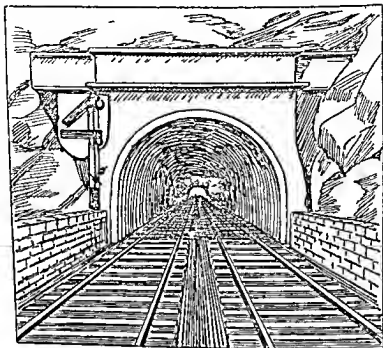


Fig 1 —A diagram to show how distant objects are apparently reduced in size.

EXERCISES

- 1 Measure the length of the school desk by using the first joint of your thumb as a unit.
2. Draw its shape on paper making the sides smaller but in proportion to the number of units
3. Measure the drawing with a ruler marked in inches and parts of an inch
- 4 Make a plan of the desk and seat, and show the position of the inkwell

Your plan will not be the actual size of the desk. Probably each inch of the drawing is equal to one foot of the desk. This plan is, therefore, drawn to a scale of one inch to a foot.

The desk is one of various objects in the room, and its position and the positions of the other objects can be marked on a plan. The sides of the room can be measured conveniently by striding, and a plan drawn from the number of strides, each stride being represented by a small

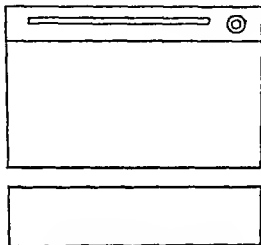


Fig. 2.—Plan of a scholar's desk

measurement. The actual length of the room can be obtained by measuring with a ruler, and the length of the stride noted for use on other occasions.

EXERCISES

1. Draw plan of classroom to scale of one inch to six feet. Put in the positions of desks, cupboards, and windows
2. Make a sketch of the classroom as seen from one corner. What advantage has a plan over a sketch?
3. Draw a plan of one room of your own house.
4. Redraw any of the earlier plans, making the sides half the size. Note that the result is to give a plan one-fourth of the first plan.

14 Elementary Geographical Principles

The higher the balloon ascends, the more extensive but the less accurate the view becomes, particularly at the outer edges.

DIRECTION.

Having completed the plan of the school and its neighbourhood, it is necessary to study its relation to the parts still farther away, and to do this more accurately we must learn how to fix direction. If direction were not considered, it would be possible merely to turn the plan round, and the parts which at first were on the left would appear on the right, while the doors and windows would appear in a different position.

By observation it can be found which side of a room always receives the sun's rays at a certain time of the day, and also through which windows the sun never shines during school hours.

If a stick be placed in an upright position in the playground, some useful lessons may be learnt by watching the shadows cast by it at different times —

- 1 The shadow will lie in different directions at different times, and its length also will vary.

- 2 The shadow will travel in the opposite direction to that along which the sun travels.

- 3 The shadow will grow shorter for the first part of the day, and will begin to increase in length during the latter part.

- 4 When the shadow is shortest the sun will be

highest in the sky, and this time is called noon. The position of the shadow on the floor should be marked, and a rough time measure made, like the one in Fig 5.

The line of shadow cast at noon is most important, as, since the sun is then in the south, this line marks north and south, the south end being the end of the shadow nearest the stick.



Fig 5.

NOTE — In summer the shadow at noon will be shorter than the stick. In winter the shadow at noon will be longer than the stick. (See Fig 6.)

If the experiment is tried at different seasons of the year there will be a slight variation in position, and the noon shadow in winter will be much longer than the noon shadow in summer.

EXERCISES.

1. Measure length of stick.
2. Measure length of shadow.
3. Draw these to form two sides of a right angled triangle.
4. Complete the triangle.
5. Measure the small angle at the base of the triangle.

If this is done in summer and again in winter, two different triangles will be formed.

The small angle formed by the hypotenuse and the base of the triangle must be measured accurately, since it gives the altitude of the sun, while the variation of the angle shows that the altitude varies as between summer and winter. (See Fig 6.)

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The classroom is probably only one of a number of classrooms on the same floor of the school. If so, a plan of this floor should be

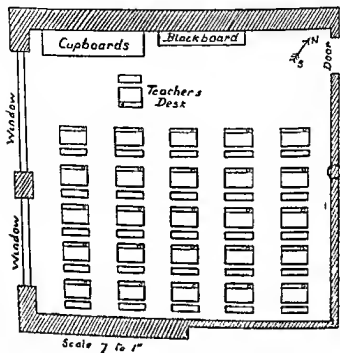


Fig. 3.—Plan of a classroom.
Will the sun ever shine into this room?

made next by comparing the sizes of the rooms, and measuring the corridor and hall of the school.

Having a plan of the school, it may be shown now in relation to its surroundings by both a picture and a plan. The playground and the adjoining streets should be marked

By ascending in a balloon, a view of the earth below is obtained, quite different from that seen through the school window. It is much more like

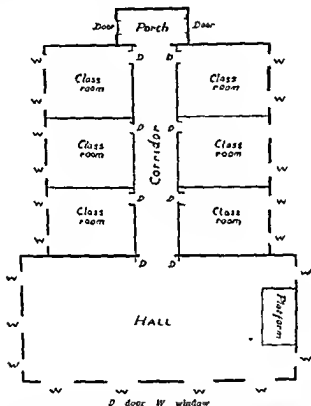


Fig 4 -Hall, corridor and classrooms of school.

a plan of a district showing the position of the roads, railways, canals, and buildings. But, even in this case, the parts immediately underneath are more exact than those farther away. the more distant parts have become distorted

14 Elementary Geographical Principles

The higher the balloon ascends, the more extensive but the less accurate the view becomes, particularly at the outer edges

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- 5 Measure the small angle at the base of the triangle

If this is done in summer and again in winter, two different triangles will be formed.

The small angle formed by the hypotenuse and the base of the triangle must be measured accurately, since it gives the altitude of the sun, while the variation of the angle shows that the altitude varies as between summer and winter. (See Fig 6)

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When the North and South line has been found, it is easy to obtain the East and West by drawing

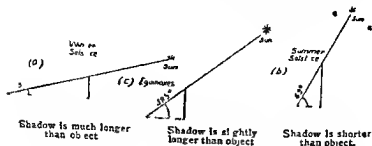


Fig 6 —Showing the altitude of the sun at noon in London at different times of the year

a line at right angles to the North and South line, marking the east on the right-hand side when viewed from the south

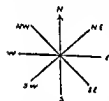


Fig 7

These directions are still more easily found at night. Neither moon nor sun is ever seen due north in the British Isles, but the stars will give an accurate direction.

A careful examination of the sky on a starry night will show seven stars arranged as shown in Fig 8

These seven stars, forming a figure something like a plough are known as the Great Bear. The two at the end of the plough are called "The Pointers," or sometimes "The Dippers." If these are connected by an imaginary line, and this line is continued, the first bright star which the line appears to touch, is the North Pole star, or Polaris.

This is "directly over" the North Pole. It may seem to us an easy matter to get there, but we know how difficult it is, for the North Pole has only recently been reached

In winter we often see the sun rise in the morning, and notice its position all through the day, but in summer it rises very early, makes a long journey,

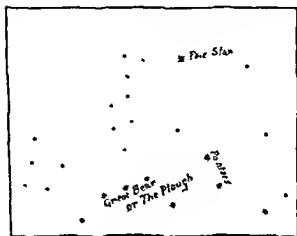


Fig. 8.

and, reaching a high altitude at noon, finally sets late in the evening. The path which it follows at different seasons therefore appears to vary considerably. In winter its path forms a small arc, but in summer the arc is much larger

The exact position of its rise in winter is sometimes much more to the south than due east, and at this season it does not set due west, but nearer to the south. In summer it rises on the north side of east and sets on the north side of west, so that it is

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possible for a room, with one of its windows pointing due north, to receive the sun's rays early in the morning and late in the afternoon. (See Fig 3)

THE WEATHER-VANE

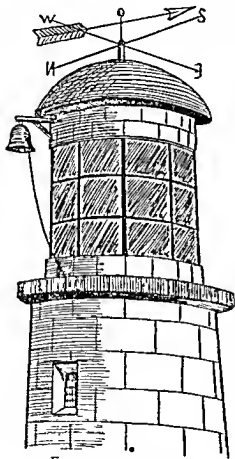


Fig 2.—A weather vane

Church towers and the tops of other buildings we often find surmounted by a weather-vane. This consists as a rule of two iron bars at right angles, arranged to show north, south, east, and west, and fixed in correct positions. Generally an arrow, with a broad end to catch the wind, is made to move freely above the cross-bars. As the wind turns this round, the pointed end of the arrow indicates the direction from which the wind is blowing.

The compass is more commonly used to find

direction, but as it is not absolutely accurate, certain calculations have to be made when using it. It is sufficiently accurate to aid us during a fog, or, if we possess a map, to assist us in choosing our way through a strange district.

THE COMPASS.

The compass consists of a small magnetic needle, mounted so as to turn freely. Attached to the

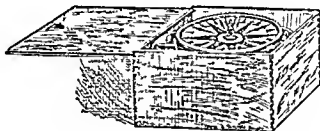


Fig. 10 —The mariner's compass.

upper surface of the needle is a circular card with the "points of the compass" marked upon it, the point marked *N* being directly over that end of the needle which points north. The card swings with the needle and thus geographical direction may be ascertained. For use on board ship the instrument is so mounted that it always remains horizontal. A picture of a compass is shown in Fig 10

EXERCISES

1 Find, from the almanac, the date when the sun rises about six a m and sets about six p m. Then find the date when it rises earliest and sets latest. Draw a diagram and try to calculate how long the sun, both in the morning and evening, will be shining into a window which faces north

2 If a boy walks 50 yards due north and then 100

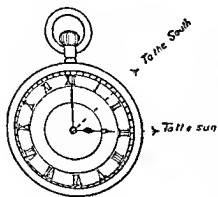


Fig 11

yards due east, how far will he have to walk to reach his starting point? and in what direction must he travel? Calculate this by means of a diagram drawn to a scale of one inch to twenty five yards.

3 Point the hour hand of a watch to the sun at any time of day. Midway between the hour hand and XII on the dial of the watch is the direction of south (See Fig 11)

THE PLANE-TABLE.

Thus far all the plans drawn have been simple, but now further parts of the adjoining district can be inserted, showing, for example, each boy's route from home to school, or from the railway station to school, the position of the railway, the canal, the river, and the chief roads

In order to be accurate, the width of the streets, canal, river, and railway must be measured, and it may be inconvenient to measure these with a tape or even by counting the number of strides taken on the journey. To find the direction and the position of certain places a plane-table is often used. A plane table can be made by pinning a piece of drawing-paper on a drawing-board and fastening this by a cord round the neck, or it may be fastened on a stand instead of round the neck. This is a better way, as it allows the observer to walk round the table without moving it.

A small spirit level is needed to tell when the table is horizontal. A horizontal surface may be obtained also by placing a steel bicycle ball upon the table, which is then moved till the ball will remain at rest upon any part. A compass is needed to mark the direction of north and south on the paper.

A sighting ruler is another instrument required. This can be bought, but it is a simple and useful exercise to make one by fixing two pins in an upright position, one at each end of a ruler as in Fig 12.



Fig 12.—A sighting ruler made by placing two pins vertically on an ordinary one foot ruler

EXERCISE

In the playground choose a straight wall and measure its length by striding. Find the direction of this wall and mark its position on the paper, which has a north and south line already drawn. Make the line about five inches long and calculate the scale as so many inches to so many strides. Bring the plane table to one end of the wall, taking care that the line drawn on the paper is parallel to the wall.

Next fix on an object such as a football flag or post (X in Fig

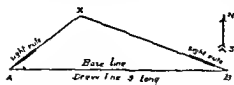


Fig 13

13) some distance from the wall arranging the sighting ruler so that one end of the wall the two pins, and the distant object are in one and the same straight line. Draw the direction of the

line on the paper. From the other end of the wall fix the sighting ruler in the same way as before and draw the direction. The two lines, if continued on the paper, will give the position of the distant object drawn to the same scale as the first line or base line. Its distance may be calculated by measuring with the ruler

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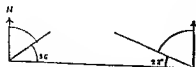


Fig 14

This experiment may be performed in another way. Having the fixed base line as before, the

angles between the directions of the distant object may be measured as in Fig 14

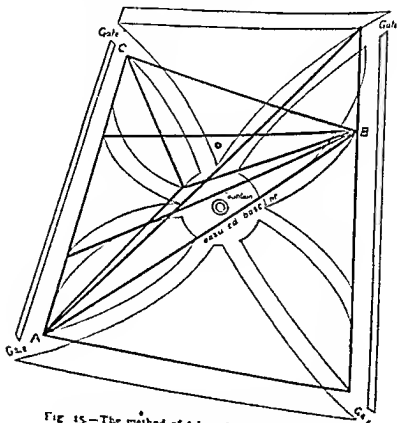


Fig 15—The method of triangulation carried on by a plane table in a small park

All points which are surveyed must be visible from both ends of the measured base line. When B has been found it may itself be used as a base line for later observations.

So far this plan has been made by allowing 5 inches to represent, say, 50 strides, but it is more accurate to measure the length of the wall in yards

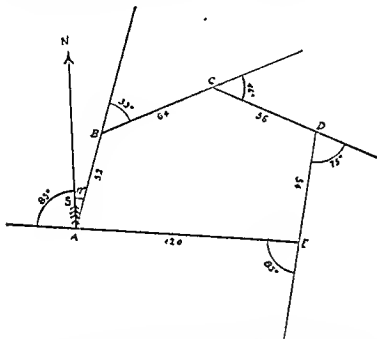


Fig 16.—Rapid surveying.

From *A* the direction of north is found by compass. Some object is sighted in direction *AS*. The angle between *AS* and *AB* is taken from compass. Paces are counted from *A* to *B*. At *B* a second object *C* is sighted. The angle at *B* is taken and paces from *B* to *C* are counted. This is done all around the field, and the result is shown in Fig 16.

by means of a tape measure. The actual distance, in yards, of any object can be found next. The shape and size of a football field can be obtained by this method of *triangulation*, as, having got the first triangle complete, any of its sides may be used as the base line of another triangle.

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Quick surveys which need not be exceedingly accurate are sometimes made as follows. From a fixed place *A* the north and south are obtained. A distant object *B* is noted and a line drawn to show its direction. Striding a certain number of paces in this direction a halt is made, and from this second position the distance to some object on one side is calculated. This is done at regular intervals along the line, and finally a diagram as in Fig 16 is obtained.

CALCULATION OF HEIGHTS AND DISTANCES

The width of a river may be found in the following manner without crossing the stream

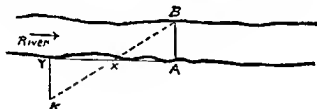


Fig 17

1 From one side of the stream, *A*, fix on an object, *B*, such as a tree, directly opposite. Walk along the side of the stream at right angles to line *AB* to the point where the angle *AXB* is 45° , as shown by the protractor. Draw a plan of this. If *AX* is known by the striding or measuring method, *AB* is easily calculated. (See Fig 17)

2. Another method is to walk from A , opposite the tree at B on the other side of the river, for 50 paces. At this point X fix up a stick. Continue the walk along the same line for another 50 paces to Y . Again mark this point. Now walk to K at right angles to the line AY until the distant object B and the stick which was set up at X are in the

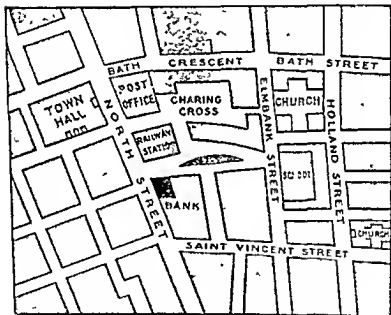


Fig 18.—The plan of part of a town.

same straight line. The distance between Y and K gives the width of the river. (See Fig 17.)

3. A third method is to take two sights of the distant object B , as in last case, from A and X and draw the plan on a piece of paper as for triangulation. If a vertical line BY be drawn from

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B on to the base line AX , this can be calculated from the length of AX , and the width of the stream which is represented by BY can be found.

EXERCISES

- 1 Make a plan of the school playground by using the plane table
- 2 Draw a map of your own district, finding the distance accurately between two points, and using the church steeple as your distant object. Make several observations. Do not attempt too large an area.
- 3 Find the width of your own street. Verify the result by measuring
- 4 Buy a plan of your own town or village. Colour the school red, the roads brown, the river blue the park green the railway black. Mark rings round LP , lamp-post, FP , foot path, LB , letter box.

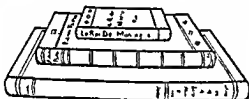


Fig 19 —Picture.

All the maps or plans drawn so far have taken no account of the difference in level of different

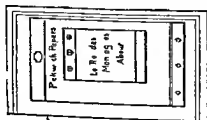


Fig 20 —Plan.

parts of the ground. Maps of all portions of the British Isles have been drawn to certain scales,

showing not only the exact relative position of the various parts, but also the position of hills and plains, the width and depth of valleys, the size of rivers, and the distances of these various features from the sea coast.

The method of indicating different heights is best illustrated by using simple objects. If three books of different sizes be placed one on the top of the other, they appear as in Fig 19. But looking down upon them the appearance would be as in Fig 20.

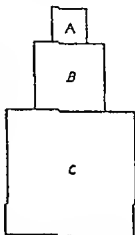


Fig 21.—Elevation of three cubes placed one on the other

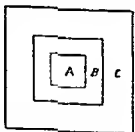


Fig 22.—Plan of the three cubes A B C

Fig 19 is a *picture*, while Fig 20 is a *plan*.

Three cubes of different sizes placed one on the other would appear as in Fig 21, but in plan they would appear as in Fig 22.

Next examine a cone which has two circles drawn round it parallel to the base. These would form parallel bands which can be shaded by different methods.

The plan contains three circles. The largest is a plan of the base of the cone, and the others indicate the size of the circles which are drawn round the cone at different heights. The smaller the

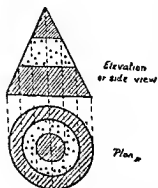


Fig 23

circle is in plan, the higher its position is in the elevation. The centre of the plan is the apex of the cone in elevation.

EXERCISES.

1. Obtain a piece of clay and press it into the shape of Fig. 24. Put it flat on a board. If the board be crayoned blue in colour the clay will not be unlike an island in the sea.

2. Near the top, draw a line round the model, keeping this line the same distance from the base.



Fig 24

3. With a sharp knife cut off the model along this line and draw a plan of the model as it now stands.

Fig. 25 shows the coast-line, and a contour line which, keeping a certain fixed distance above the coast-line, indicates a definite altitude. It shows also the shape of the land at this altitude.

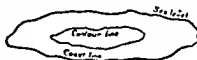


Fig 25.

A contour line is therefore a line connecting all places at the same altitude above sea-level, and



Fig 26.

marking out the actual path along which a traveller would walk if he determined to keep at the same altitude.

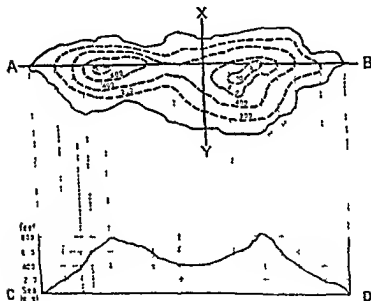


Fig 27

If the model be placed in water and sunk to the level of this contour line a new coast-line would be formed coincident with the contour line.

If the model be cut vertically through its highest

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point and viewed from the front, a section is obtained

By taking a number of contour lines the relief of the island can be determined accurately, as the nearness of the contours to one another shows the steepness of the hill slopes

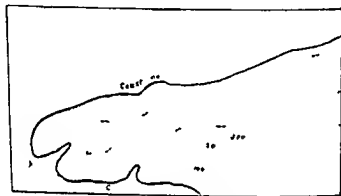


Fig 28 — A promontory

Fig 27 shows contour lines marked on a map of an island the figures indicating the heights being placed *within* each particular contour line. The contours may be coloured according to a uniform system. From this plan sections may be obtained describing the actual variations in level a man would experience in travelling across the island from east to west, or from north to south.

To draw a section such as would be obtained by cutting the island along the line *AB*, a number of lines are drawn at right angles to the line *AB*. Parallel to the line of section *AB*, a base line *CD* is drawn and on this the section is built.

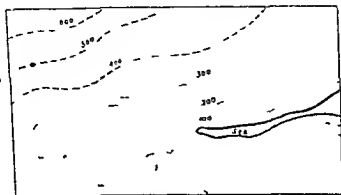


Fig 29 —A ford.

Other lines are drawn parallel to the base line, according to scale, and of uniform distance apart. The scales should mark the relation between the

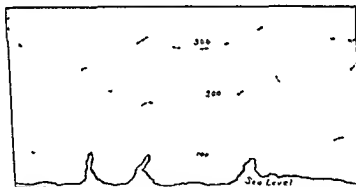


Fig 30 —A rocky coast

height of the ground and the distance across the island, but it is possible to get three or four sections, each showing a different result

Various sections can be taken but the method is the same in all cases. Sometimes, however, when

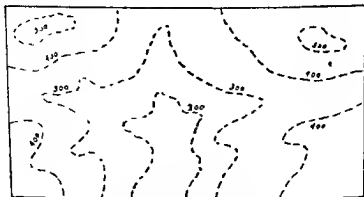


Fig. 31.—A valley system.

the paper is not convenient, a method of *transference* is adopted.

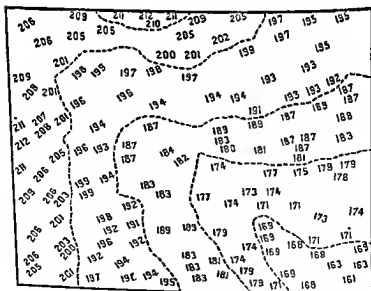


Fig. 32.—The elevations are obtained by observations, and the contours put in afterwards.

Various types of contours are exhibited in diagrams 28, 29, 30, 31.

Examples of maps indicating elevations by means of contour lines are given later in Part III of this book

Sometimes map surveyors obtain the altitudes of a great number of places, noting the positions of the various stations. The result is shown in Fig 32. It is then possible to draw contour lines at regular intervals, and thus obtain the ordinary type of contour map

EXERCISES

1. Put contour lines on the following diagram

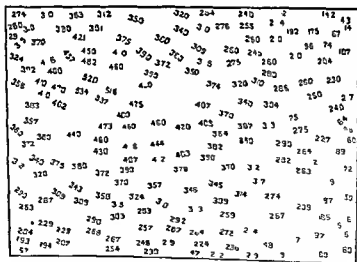


Fig 33.—These numbers represent the altitudes in feet above sea level

2. Draw a series of contour lines to show a range of hills from which a number of streams flow toward a coast line with steep cliffs.

P.F.C.

C

34 Elementary Geographical Principles.

3. A lake stands at an elevation of 300 feet, and is drained by a small river across which a railway is carried. At the upper end of the lake two rivers enter from the high land to the north. The east and west are bordered by country over 700 feet in height at the lowest part, some of the peaks reaching 1500 feet. Draw a map to show the river, lake, and mountains, using contour lines to mark the altitudes

4 Compare Fig 28 and Fig. 29 Account for the difference.

HACHURING.

Just as the height of the ground may be shown accurately by contour lines, so it is possible by



Fig. 34.

means of shading to indicate the slope of the ground. Lines are drawn at right angles to the contour lines, the shorter the lines the steeper the slope. Such a process is called *hachuring*, and is shown in Fig. 34.

You can obtain a map of your own district from the stationer, which will contain the hachuring as well as the contour lines and also indicate the position of the school, and the village or town in which it is situated. The neighbouring

towns and their positions should be noted also. Notice that the roads leading from one town to another are often named after one or other of the towns. Mark and name the highest hills in the neighbourhood, and also the rivers which flow from the hills. Railways and canals should be marked as previously shown. It is most important that one or two of the contour lines should be indicated by tracing with a coloured pencil.

From one of the hills marked, try to discover how far it is possible to see in certain directions. By this means higher hills are observed. Trace the shortest routes from certain points to other places, avoiding marshes and difficult rivers, calculating the actual distances by using the scale, and noting how bridges shorten routes.

EXERCISE.

Write an essay on "The physical geography of your own district, and the effect which the physical features have had in deciding the positions of the towns and villages and also in determining the directions of the roads and railways."

ORDNANCE SURVEY MAPS

Detailed and accurate maps of each district have been compiled. They are drawn to various scales, the larger scales containing far more detail than the smaller ones. The commonest used are—

- 25 inches to a mile
- 6 inches to a mile
- 1 inch to a mile

36 Elementary Geographical Principles.

For simplicity, and to avoid confusion of names certain signs and symbols are used. These are employed in the Ordnance Survey maps and are shown in Fig. 35.

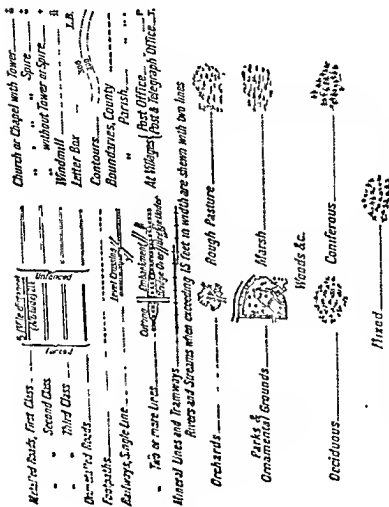




FIG. 15.—Signs and symbols used on Ordnance Survey maps.

COMMON ABBREVIATIONS.

<i>B.M.</i> , Bench Mark.	\blacktriangle	<i>Sta.</i> , Station.
<i>By M.</i> , Boundary Mark.		<i>W.</i> , Well.
<i>F.B.</i> , Foot Bridge.	Δ	Trigonometrical
<i>F.P.</i> , Foot Path.		Station.
<i>L.B.</i> , Letter Box.	\leftarrow	Direction of Run-
<i>S.B.</i> , Signal Box.		ning Water.
<i>Woods</i> and <i>Plantations</i> ,		<i>Pastures</i> , 

A six-inch map is useful for the district near home, but a map on the one-inch scale is best for ordinary work.

EXERCISES ON ORDNANCE MAPS

1. Measure the length and breadth of the map and find the area represented.
2. Find examples of the various symbols used.
3. Measure the length of the railway between two towns; also measure the road. Notice the markings which indicate when a railway is in a cutting, and on an embankment.
4. Find any area marked as a park or plantation.
5. Choose two hills, and find the shortest route between them. Note carefully the positions of rivers and marshes which make certain routes impossible.
6. Mark the position of the bridges over the stream and judge which will be most used, by considering the positions of the neighbouring towns.
7. Make a drawing of one of the hills, by tracing the contour lines. Hachure this so as to obtain an idea of the shape and slope of the hill.
8. Find the area of the hill.
9. Draw a line diagonally across a one-inch map. Make a section along this line using a vertical scale $\frac{1}{2}$ the horizontal scale.
10. Describe a part of the map.
11. Draw a section along a line passing due north and south through the middle of the map.

THE HOME DISTRICT.

Geography is a science dealing with facts which have been proved by observation. It is astonishing how frequently these facts recur in different parts of the world and it is only by comparing them, and the conditions under which they are found, that Geography becomes helpful as well as interesting. The district around your own home, or near your own school, will provide numerous facts and numerous illustrations of the principles of Geography.



Fig. 36—A typical section on through a 'home district'.

On the survey map of your own district you have already noted the high ground, the valleys, and the streams which flow down the valleys, marked the position of the chief roads and railways, and the towns and villages which these roads and railways connect. Other work can now be done. The heights of the various hills can be compared by drawing a section across the map having the vertical scale in some definite ratio to the horizontal scale.

EXERCISES

1. If there are any stretches of level country mark the boundaries and measure the areas by means of squared paper.
2. Find the North, South, East and West by putting up a stick in your own garden.

3. Find the direction of your own street and also note whether any church spire or hill rises to the north of your house. The direction in which the doors and windows of your house face is most important.

4. Find the distance from your home (a) to the school, (b) to the park, (c) to the river, by the nearest route.

THE WORK OF RAIN AND RIVERS

HAVING noted the positions of the streams in the valleys, they should be traced on a larger map, and their courses

followed to the sea. Let us trace the course of one of them. Walking along the stream for a few miles it will be noticed that other streams join it. Certain facts will be learnt during the walk. If the river is in flood it will be during

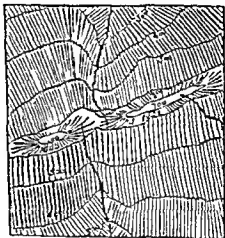


Fig. 37—A Water shed.

rainy weather, and we naturally learn that much of the rain which has fallen finds its way into the river. It may sink into the soil, or it may flow directly from the roofs of buildings, down pipes and sewers, but in either case it arrives at the river and is then carried to the sea. Only a small amount is taken up to feed the plants, grasses, and trees. Some of the water will pass down the

side of a hill and some down the other, and the hill is spoken of as a water-parting or water-shed.

Several water-partings may be found in the district, though they will all be branches of a greater mountain chain some distance away

The district between two water-partings forms the area from which the stream draws its supplies of water, and is called its basin

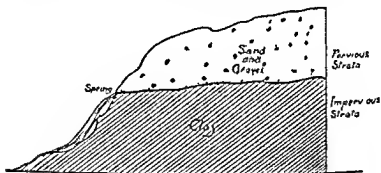


Fig 33 —Formation of a spring

Probably during the walk, water will be observed oozing out of the ground as a spring. This has trickled through the sandy soil till, meeting with impervious clay, it has been forced to pass along the surface and has found an outlet at the spring. (See Fig 38)

When the river is in flood, the water will be very muddy. If a glass be filled with this muddy water and allowed to stand, the bottom will become covered with fine particles the water itself becoming clear. The mud suspended in the water of the river was being carried along by the stream, and

every river in the world is carrying down some sediment, the amount being greater or less according to the character of the district

Where does this mud come from? It is the result of the action of rain, frost, wind, and river wearing away the sides and bed of the valley, which in consequence becomes both wider and deeper, while the hills themselves are gradually made lower. All the stones in the bed of the stream are rounded because they are knocked against one another by the force of the water, the small angular parts being thus worn off. These smaller particles are more easily transported. The larger stones are gradually worn by friction, or are broken into smaller pieces.

If the banks be examined after the flood has subsided, much fine mud will be found deposited. This gives a fair idea of the way the banks of some large rivers are covered with silt or fluvial material upon which large quantities of grain can be grown.

The speed of a river flowing into a lake is checked, and the muddy matter deposited in the hollow will eventually fill up the lake (see p. 123). If there are no lakes in its course, the silt is carried to the sea, where it is spread out in broad fan-like deposits, across which the river flows through fresh channels. Such an area with its numerous streams, is called a *delta*. (See Fig. 39.)

The pebbles in the bed of the stream, though possessing the same rounded appearance, differ

in other respects. Some are composed of little rounded particles of sand knit together by a kind



Fig. 39 —The Delta of the Mississippi.

of cementing material, which will be seen clearly if the pebble is smashed. This is a sandstone, and each particle has in all probability been rounded by the action of moving water either in a river bed or on the sea-coast, before it became formed into a compact sandstone.

THE ROCKS OF THE DISTRICT.

Another pebble, which has a bluish colour, will break along certain planes. It is a piece of slate. A flagstone will break in the same way, but its colour is different, and on the surface of one of its planes little glistening particles of mica are generally seen.

Pebbles with a mottled appearance are common in various districts, some showing black and white, and others red, black, and white parts. Such

stones are pieces of granite. Obtain specimens if possible and compare them; try to find out how they came to the bed of the stream, but remember that eventually they will be worn down to small particles, and the finer the particles the farther will they be carried by the river.

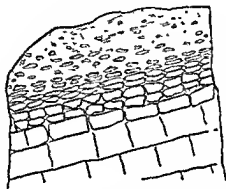


Fig. 40 —Diagram to show the weathering of huge blocks of rock into soil.

In most districts it would be impossible to walk far without coming to a quarry which exposes the rocks beneath the surface soil. This quarry no doubt will contain materials which are related in structure to some of the pebbles found in the brook.

The arrangement of the materials in the quarry is instructive. Through great cracks which pass downwards from the surface, the rainwater finds its way, the bottom of the quarry probably becoming full of water. Besides these vertical cracks or joints, there may be to 3 horizontal lines which

in some cases separate rocks of different kinds. Rocks found in this form are called stratified rocks, and they include limestone, chalk, slate, and flagstones. Even the soil on the surface may be due to the break-up of these stratified rocks below, and an inspection of the sides of a quarry often reveals a gradual change from solid blocks to fragments of soil (See Fig 40)

The colour of the soil may be reddish, as in Worcestershire, where it has been formed from the red sandstone, or it may be of a gray colour, as in Cambridgeshire, because it contains a large proportion of chalk, the surface soil often being an indication of the rocks beneath

THE VEGETATION

Having noted the chief features of the district near the stream, it becomes necessary to notice the vegetation in the neighbourhood. Various plants are grown in the fields, but, as a rule, some agricultural products are more common than others in any particular region, for instance, potatoes, turnips, and mangolds, are generally grown in one locality, while another produces wheat, rye, oats, and fruit.

Notice the wooded parts of the home district and see how such places are marked on the ordnance map.

Find out the names of the trees and learn whether the place is sheltered or exposed. If the

area is exposed, the trees will lean in a direction opposite to the prevailing wind, and in a bleak district they will be dwarfed. In the colder parts only such trees as the pine, fir, and silver birch grow well, while in the more exposed districts heather, gorse, and coarse grasses are the only things that thrive.

Your own garden will prove that some parts are far better suited to the growth of plants than others, this depending upon the amount of sunshine and shelter.

EXERCISE

On the home district map write the names of the various plants which grow in the fields.

OCCUPATIONS OF THE PEOPLE

It is necessary to learn whether the occupations of the people in a district are due to the materials found in the ground, such as coal, iron, salt, or whether they are determined by the products of the soil, such as fruit, grain, roots, and grasses. The answer determines whether the people are mainly farmers, miners, or workers in mills and factories. Frequently the industry carried on in mills can be traced to some local condition.

Take careful note of the position of the nearest large town, the routes to it from the surrounding towns, and any reason which may account for its being more important than those around.

WEATHER CONDITIONS.

No feature of geography which pupils can work for themselves is so interesting as the collection



Fig 41 — A maximum and minimum thermometer combined

of statistics regarding climate, and this can be done best for the district near home. Every scholar knows that daylight lasts longer in summer than in winter, and it is useful to keep records of our daily experiences. Among other matters, the amount of rainfall and of bright sunshine recorded daily should be noted, the results being tabulated and then graphed. By this means, if the records be kept faithfully, much information with regard to the climate of the district will be obtained. This

should be done for several successive days the results always being tabulated.

TEMPERATURE.

The highest and lowest temperature for the day should be obtained by means of maximum and minimum thermometers



Fig 42 — A barometer

These are so constructed that a small index placed within the bore of the thermometer indicates the recorded temperatures without constant observation.

*The record may be kept as in Fig. 43.

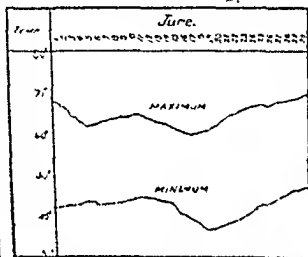


Fig. 43.—Thermograph for one month.

When these have been obtained for a whole year, a simple diagram may be drawn to mark the variations during the period, thus showing the hottest and coldest months.

must be obtained, and at the end of the year the wettest months can be noted easily from such a graph.

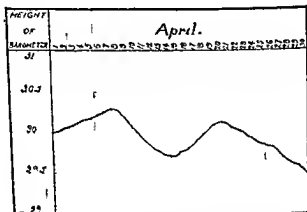


Fig 44 —Graph to show how the barometer varies during one month.

THE RAINGAUGE.

The amount of the rainfall is found by means of a *raingauge*, which is shown in Fig. 46. Every boy can make a raingauge for himself, all that is necessary being a filter funnel, and a bottle with the same area at its base as the funnel contains at the top. By using the funnel, a larger area than the neck of the bottle is exposed to catch the rain, while the small hole, though permitting the water to run into the bottle, prevents evaporation. If the instrument is placed in an exposed part of a yard or garden, it collects a

sample of the rainfall for the place. The measuring of the rainfall is done by a measuring cylinder; the measurer can be used only for its own raingauge.

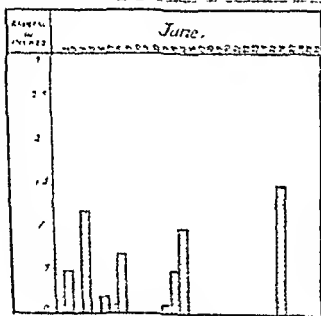


Fig. 46. - Rainfall diagram.

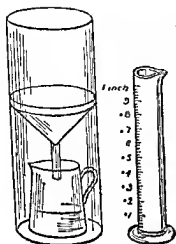


Fig 46 --Raingage.

An instrument for measuring the rainfall. A depth of one inch in the receiver should almost fill the long narrow cylinder. By thus lengthening the column of water in the cylinder it becomes easier to mark out small fractions of an inch.

the gas jar so as to show tenths and even hundredths of an inch, and hence the rainfall can be measured much more accurately.

When the relation between the receiver and the measurer is understood, *taking the rainfall* is simple, because the rain which has collected in the receiver during twenty-four hours is poured into the measurer and the exact amount obtained.

Various other statistics should be collected by every pupil, and recorded on a

single sheet which might be arranged in the following manner:—

Date	Rainfall	Direction of Wind	Max temp	Min temp	Height of Barometer	Condition of Weather	Time of Sunrise	Time of Sunset

Fig. 47.—A typical weather chart.

Part II.

THE BRITISH ISLES.

THE KINGDOM TREATED AS ONE REGION POSITION AND SIZE.

The British Isles is the name given to a group of islands off the west coast of Europe. Some are mere rocks and are not inhabited, but two of the group are fairly large, and are known as Great Britain and Ireland. Different countries, now united under one king, form the United Kingdom of Great Britain and Ireland.

The areas of these countries are as follows :—

	Square Mi's.
England	51,000
Scotland	20,000
Wales	7,000
Ireland	32,000
Other Islands	1,000
Total	<hr/> 120,000

EXERCISES.

52 The Kingdom Treated as one Region

At one time the British Isles formed part of the Continent of Europe, the seas which now surround our shores being valleys. The coast line

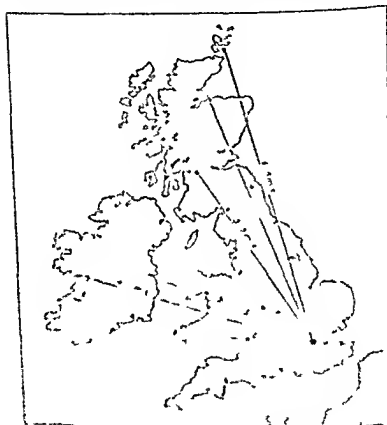


Fig. 1. The British Isles

All the islands of our archipelago are situated on this shelf, and are known as continental islands.



Fig. 49 —The continental shelf.

Since the small islands are composed of materials very similar to the land near them and the British Isles as a whole, show the same structure as the Continent of Europe, so we believe they are a

54 The Kingdom Treated as one Region.

detached part of the Continent, our mountains being continuations of Scandinavia, and our plains a portion of the plain of Europe.

The British Isles form a small country as compared with some of our own possessions. But, though small, they have a wonderful variety of physical features, and are full of splendid examples of geographical principles, such as the influence of physical features upon means of communication, as well as the influence of climate upon vegetation.

EXERCISES

1. On a physical map of the British Isles find the most mountainous parts.

2. Trace longitude 0° and longitude 10° W. across the map. Trace also latitude 50° N. and 60° N. Note how little of the British Isles lies outside these lines.

3. Compare the longitudes of Glasgow, Edinburgh, and Newcastle with the longitudes of Manchester, Leeds, Birmingham, Bristol, and Southampton.

4. Find other places in the British Isles near the same lines of latitude as Belfast, Dublin, Cork, and Limerick.

The position of the British Isles between Europe and America has greatly aided the trade of our country, while, though the seas around are narrow, they protect us from invasion without hampering our trade.

STRUCTURE.

Examining the physical map, we find that the high lands cover a larger area than the low lands in Scotland and in Wales, but that England and Ireland contain more low land than high land.

The higher parts of Scotland are separated from one another by lower areas, which naturally divide the country into regions. Glenmore separates the



Fig. 50.—Diagram to show the nature of the British archipelago if the region were submerged 600 feet.

North-west Highlands from the Central or Grampian Highlands, while the Midland Plain divides the Grampian Highlands from the Southern Uplands. If Scotland could be sunk down into the sea to the depth of the 600 feet contour line, this contour line would then become the sea

56 The Kingdom Treated as one Region

coast, Glenmore would be a channel of water but not so wide as that which would cover the Midland Plain, the Grampian Highlands would form the largest island. This is exactly what has happened on the western side of Scotland. The Minch was at one time a valley between the mountains of the Hebrides and the mountains of North west Scotland, the present chain of islands then forming a chain of mountains. Now the islands are separated from one another by channels of water, but these channels were formerly valleys containing streams which joined the larger river flowing along the valley of the Minch.

The widest portion of Scotland is the highest, and here the rivers are longer than in the other parts. Large lakes, all long and narrow in shape with rivers flowing in at one end and out at the other, lie in the valleys.

The Midland Plain is not level, as ranges of hills stretch across it from Ayrshire to Fifeshire, while the three largest Scottish rivers flow across it to the sea.

The mountains of the south are not so high as the Grampians and the scenery is not so grand. This part is called the Southern Uplands, and, without any decided break, the hills continue as the Cheviots into England.

c EXERCISES

1 Measure the mountainous areas of Scotland by squared paper and compare the total area of high ground with the total area of the country.

2 Name the mountains, rivers and lakes and mark their positions on small outline maps of the different parts

3 Measure the lengths of the Spey, Tay, and Clyde by rolling a sixpence along the length, and compare these rivers with the smaller rivers of the north

4 Find the area of the largest lake in Scotland and compare its area with that of the largest island

If a line be drawn across South Britain from Flamborough Head in Yorkshire to Start Point in Devonshire, all the high lands will be found on the northern side. These mountains embrace the Pennine Chain and the mountains of Cumbria, Cambria, and Cornwall. The district contains also some lower areas, but they are far less extensive than the mountains.

The Pennines, passing down the middle of the country, are sometimes called "The backbone of England," the various spurs on each side of the central chain giving the appearance of a backbone with ribs attached. Rivers run down each side of the Pennines, sometimes flowing together as in the case of those which empty themselves into the Humber estuary.

The chain is broken by valleys or "Gaps," which allow roads and railways to be constructed more easily, thus affording means of communication between the east and the west of the chain. The two most important valleys are the Tyne Gap and the Aire Gap. There are also other passes, such as Stainmore Pass, Woodhead Pass, and Edale Pass. The Cumbrian Mountains are joined to the Pennines by Shap Fell, which forms a barrier

58 The Kingdom Treated as one Region

between the Eden Valley and the Plain of Lancashire The Cumbrian Mountains radiate like the

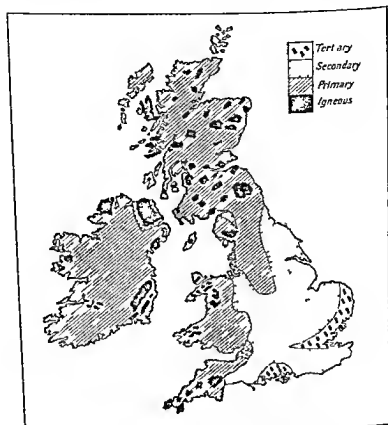


Fig 51 —Simplified geological map, showing the positions in the British Isles of the four classes of rock.

spokes of a wheel, the valleys between the chains opening to the north, south, and west. The streams watering the valleys are beautiful and clear, and add to the charm of the district. Nearly every

valley contains its lake, and the region is therefore known as the Lake District.

Wales is almost all mountains, only the coast district being low land. When we reach the mountains from the English plain, we are in Wales. The mountains are highest in the north, near Snowdon, and the land becomes lower as we travel southwards. Even the peninsula of Cornwall and Devon may be regarded as a continuation of the Welsh mountains, for the Bristol Channel is only a valley below sea-level. In the Cornish peninsula the mountains are lower than in Wales, but, by placing a ruler on the map so as to touch Holyhead and Lands End, the limits of Wales and Cornwall are seen to lie along this line. The mountains and valleys of Wales are remarkably parallel to one another, and their direction—north-east to south-west—is common to many of the physical features of the British Isles.

On each side of the Pennine Chain lies a plain. The one on the west extends from the Lake District, through Lancashire and Cheshire. The one on the east extends from the coast of Northumberland, and Durham through Yorkshire to the Midlands; but it is separated from the Yorkshire coast by the Cleveland Hills and the Wolds.



Fig. 52—Section through a chalk escarpment.

When the chalk wears away it breaks along the joints giving the steep-edged escarpment. The clay gives a plain. The dip slope gives the direction in which the rivers flow.

The union of these two plains forms the Midland Plain, which is bounded on its south-east by the hills from the mouth of the Severn to the north

east coast of Yorkshire. There are three easy passages from the ports on the coast to busy towns of the Midland Plain, namely: the Cheshire Gate at the north-western corner, the Trent Gate to the north-east, and the Severn Gate to the south-west. Other passages are found through the escarpments on the south-east, but these are generally much narrower. The Midland Plain is not level, and tributaries of the Trent, Severn, and Avon have made the surface quite irregular.

The south-eastern corner of Great Britain is known as the Scarplands, because the hills generally show a gently sloping side, and another side with a very steep face, forming an escarpment. (See Fig. 52)

These rather low hills follow long lines of ridges,

which remain standing because they are composed of calcium carbonate, a material more difficult to wear down than that forming the plaies.

Starting from the area of Salisbury Plain, these ridges run in easterly and north-easterly directions.

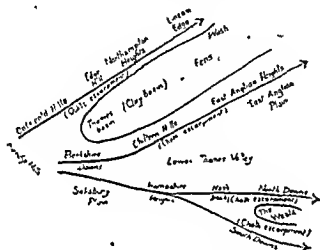


Fig. 53.—Diagram to show the direction of the hill ranges of the scarp lands.

Those running to the north-east are the Cotswold Hills and Lincoln Heights; a second belt forms the Chiltern Hills and East Anglian Heights. Those to the east are the North and South Downs, while the Dorset Heights extend toward the south.

Most of these escarpments have fairly flat tops where large numbers of sheep feed. Between the ridges are farm lands or fruit and flower gardens, and in these plains the towns and villages have been built rather than on the hill tops. Through

the gaps run roads and railways, mostly converging on London, which is situated in the Thames basin, between the chalk hills lying to the north and to the south of the river.

One plain extends from Oxfordshire to the Wash, but it is divided into two parts, the one on the south west being drained into the Thames. The low land around the Wash, which was formerly bog land, is now crossed by the Welland, the Nen, and the Great Ouse, and ranks among the richest agricultural land in our country. It is still known as the Fens.

Between the North and the South Downs stretches the lower land known as the Weald, the name meaning a forest, but though trees are still numerous, the district is not so well wooded as formerly. A second basin, almost surrounded by chalk hills, is situated in Hampshire. The Isle of Wight forms part of this basin.

EXERCISES

- 1 What proportion of South east England is occupied by hills?
- 2 Measure the length of the Thames and calculate the area of its basin.
- 3 Mark the gaps in the hills through which railways pass.
- 4 Measure the area of the Midland Plain.
- 5 Measure the length of the Trent by rolling a sixpence along its course having first found the circumference of the coin.

Ireland contains more low lands than high lands, and its mountains are more scattered than in Wales or Scotland. They are chiefly in the north, south, and west, those of the north are a continuation of the Scottish mountains, but in the south they are more allied to the mountains of

Wales Along the valleys which separate the mountain ranges, rivers flow in parallel courses; the Bandon, Lee, and Blackwater in the south being good examples. The highest mountains are the Macgillycuddy Reeks, but there are others of considerable height in Donegal, Galway, and Wicklow. The central part of the country is a plain covered with clay, the impervious nature of which gives rise to many bogs. Across this plain rivers flow in various directions, the most important being the Shannon, Erne, Boyne, Liffey, and Slaney. The Shannon, the longest river in the British Isles, crosses a fairly level plain, and therefore moves slowly. Its lakes are merely hollows which have been filled by the river, hence their shores are low and they themselves are shallow and irregular in outline.

EXERCISES

1. Compare the area of Ireland with that of Scotland.
2. Draw an outline map of Ireland, and insert the names of the chief rivers, mountains, and lakes.
3. Measure the distance along the shortest lines between Ireland and Scotland, Ireland and England, Ireland and Wales.
4. Find the most northerly and most southerly points of Ireland, and note the latitude. Find also the longitude of the most westerly part.

Fig 51 is a map of the British Isles showing the different kinds of rocks which form our islands. Some of these must be more recent than others, for if a certain kind of rock is traced for a distance, it is often found to pass underneath some other material. It is, therefore, safe to assume that the

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rock which lies on the top is more recent than the one below. A good example appears in the Pennine Chain. The rocks which form the plains of Lancashire and Yorkshire do not extend over the Pennines. Older formations compose the upper parts of the chain and extend under the newer rocks on each side.

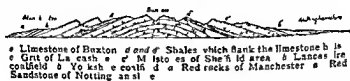


Fig 54

Fig 54 shows that some rocks are older than others, the newer rocks being on the surface. It also shows the arch into which they have been folded.



Fig 55—A general section across England and Wales

The diagram shown in Fig 55 represents a section of the rocks lying from west to east of England and Wales. From it we learn that the rocks of the east lie above those which are at the surface in the west. These eastern rocks are, therefore, newer than those of the west.

It must be noted that all the mountainous parts of the British Isles are composed of the oldest rocks, while the plains are composed of the newer materials. An exception occurs in the case of rocks

which are the result of volcanic action. Such formations, found in various parts of the world, among both old and new rocks, are due to the crystallising of the lava as it gradually solidified. The crystals are larger and more perfect where the lava has cooled slowly. Igneous rocks have no regular position, because they are due to volcanoes, which may force a passage through old or new rocks. Many of these igneous masses of rock are composed of granite, which, being very hard, remains to form mountains after the softer materials around have been worn away.

The oldest rocks are generally much crumpled and folded as the result of the great strain suffered during the long period since their formation. Slate is one of these crushed rocks, the crushing being the result of the cooling of the interior of the earth, which causes the outer crust to become wrinkled and folded, just as the skin of an apple becomes wrinkled as the inside dries.

Among these old rocks and those of volcanic origin, the grandest scenery is found, the chief parts being the Highlands of Scotland, the Lake District, Wales, and the western half of Ireland.

In Part I it was shown that rivers bore down a very large amount of matter from the hills to the plains, the scenery in these districts being due largely to the work of the streams, carried on during long periods. When the rivers are flooded their power of transporting sand, mud and stones is tremendous, and through this process the hills

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are becoming lower or denuded, and the valleys both wider and deeper. The river moves more quickly among the hills than on the plain, because the slope is greater. Some of the material will be deposited when the water moves more slowly across the plain. If it enters a lake the river will deposit all its silt and leave the lake as a clear stream, but as a result the lake itself will slowly fill up. On reaching the sea the speed of the river is checked, and great flat banks of mud and sand are gradually formed. Across these fan-shaped banks the river makes its way, often dividing itself into a number of small streams or distributaries. (See Fig. 39. Part I.)

EXERCISES.

1. What is peculiar about the position of Igneous rocks in the British Isles?

2. Why is the grandest scenery found among the oldest rocks of these islands?

3 Draw a diagram of a delta. In what way does a delta in a lake resemble a delta on the coast? In what respects do they differ?

4 Notice the position of the lakes of the British Isles. Draw maps of Lough Dearg and Windermere, and compare the two outlines. Try to account for the difference in shape.

Nearly all the long rivers of these islands enter the sea on the west, the Thames, Ouse, and Tay being the chief exceptions; but the shortest and swiftest rivers also enter on the west, because the mountains are higher on that side. Most of our rivers flow east across the plains, even the long ones which end on the west flowing east during some parts of their courses.

When the British Isles formed part of the Continent of Europe, the rivers were longer than

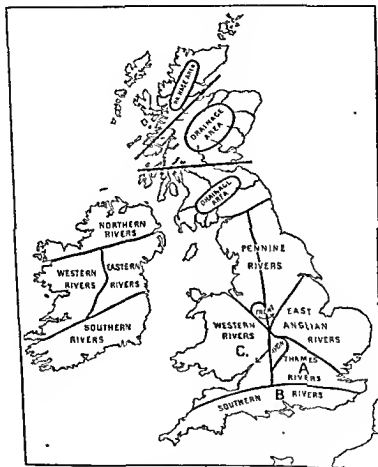


Fig. 56.—The River Systems of the British Isles.

at the present time, and probably many of them were merely tributaries of the larger European rivers. Good examples of the way the contour

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lines follow up the river valleys are seen in the Tay and the Severn, and along the numerous valleys between the spurs of the Pennine Chain

If the British Isles were sunk down 600 feet, they would present a very different appearance from the present, as all the valleys would become arms of the sea. If the land were raised 600 feet, the coast line would appear outside the British Isles along the continental shelf, and the hollows which form the North Sea and the Irish Sea would be valleys with rivers flowing through them (See Fig 50)

At the present time many coast indentations are valleys which the sea has occupied, excellent examples being the Firths of Tay, Forth, and Clyde, the Bristol Channel, and even the English Channel. Some of these estuaries pass far into the land, especially where the land is fairly low, hence the country is narrowest in such places as between the Firths of Forth and Clyde, and between the Thames and the Severn, Humber and Mersey Solway and Tyne. Hard mountain masses cause peculiar shaped coast lines, as may be seen around the Lake District in North east Yorkshire, and in the Lleyn Peninsula in Wales. In the West of Scotland and Ireland every headland is the termination of a mountain chain, and the valleys between the chains are now the lochs. Occasionally islands seem to continue the chain still farther into the sea, these being generally rocky and forming beautiful coast scenery.

The appearance is quite different when a plain reaches the coast, as in Lancashire, the Fen country, or the eastern side of the Irish Plain

EXERCISES.

- 1 How have the Needles become detached from the mainland?
- 2 Is there any relation between the kind of coast and the kind of country behind it?
- 3 What is the cause of the indentations on the west coast of Scotland?
- 4 Measure with the aid of the coast line of Wales
- 5 What parts of the British Isles have the least indented coast lines?

CLIMATE

It is usual to define the climate of a country as the weather conditions which that country experiences, the heat of the day, the cold of night, the cloudiness of the sky, the rainfall, the direction of the wind, the heat of summer and the cold of winter, are all recorded under this heading

The rainfall of the British Isles has been measured by means of the rain gauge, and the results are shown by the map (Fig 57)

Several stations in different parts of the country record the amount of rainfall for each day and from these figures the annual rainfall is calculated but, as some seasons are much wetter than others the average for several years is taken in preparing the annual rainfall map

Fig 57 shows that the mountain areas are the wettest parts and that a plain situated between mountain ranges shows a diminished rainfall as

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in the Cheshire Plain. In winter time long periods of cold, dry, frosty weather sometimes occur, and during these periods the wind blows from the

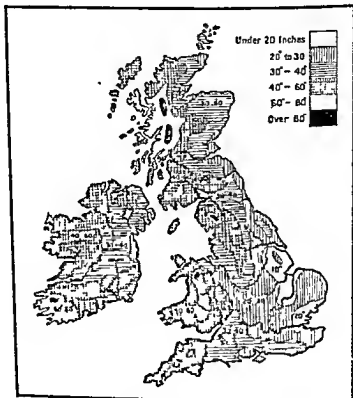


Fig 57 --Rainfall map of British Isles.

north or the east. Cold frosty weather does not generally accompany southerly or westerly winds, because the westerly breezes are laden with moisture from the Atlantic, and the southerly winds are conveying heat from warmer regions. When the

westerly, moisture-laden winds reach these islands they are compelled to rise over the mountains, and, being forced into higher altitudes where the temperature is lower, they give up some of this

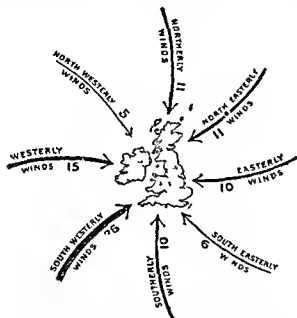


Fig. 58 — This diagram is to show the frequency of winds across these islands

The percentage is shown by the figures. Six days are allowed as a mean

moisture in the form of rain or snow, because cold air cannot hold as much moisture as warm air. The first stage of the condensation consists in the formation of very minute particles of water which float easily and form clouds. Further condensation and accumulation make the particles bigger, and eventually the water falls as rain. Snow is formed

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when condensation takes place at a temperature below freezing point. It is usual to reckon a depth of ten inches of snow as equivalent to one inch of rain.

There are two reasons therefore, why the west of Britain is wetter than the east. (a) The west is the side which first receives the rain bearing winds from the Atlantic. (b) The land on the west is higher than the land on the east.

The water makes its way to the sea, flowing rapidly over hard, rocky country, but percolating through the soil and the soft rocks in other parts. Even when it sinks for a time into the ground it generally reappears in the form of springs, and helps to fill the streams.

EXERCISES

1. Compare the rainfall of Liverpool with that of Hull. Account for the difference.
2. Draw a diagram of a raingauge. Explain how it is used.
3. What becomes of the water which falls as rain?
4. Draw graphs to illustrate the following —

RAINFALL IN INCHES

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Glasgow	4	3.5	3	2.5	2.4	3.3	4	4	3.3	5.5	4.5	4.6
Edinburgh	2	1.5	1.5	1.6	1.8	2.0	2.5	2	3	2.9	3.3	3.3

TEMPERATURE.

In summer the days are hotter than in winter, and the temperature is taken by means of a thermometer. The temperature varies at different times of the day, as well as at different seasons of

the year, and in order to find out the temperature at different times without continual observation, a maximum and minimum thermometer is used (See Fig 41)

The *mean* temperature is obtained by adding the maximum to the minimum, and dividing by 2

e g —Maximum = 62, Minimum = 38,

$$\therefore \frac{62 + 38}{2} = 50$$

It is usual to find the mean average temperature for the summer months, and also for the winter months. By drawing lines, places which show the same results can be connected on a map. Such lines are known as *isotherms*.

Even in summer the tops of mountains show much colder conditions than the plains, and if isotherms were drawn without being reduced to sea level, they would simply lie around the high ground like contour lines. The temperature has been found to fall in this country about 1° Fahr for every 300 feet we ascend.

Notice which parts are hottest and which coldest, as shown by the isotherm maps for summer and winter. It is really more important to know the range, or difference between the highest and the lowest temperature which a place experiences than the actual temperatures, the change between the extreme heat of summer and the extreme cold of winter producing a far greater effect upon vegetation than is generally supposed.

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- When the range is low a place is said to have an *equable climate*, and when high, an *extreme climate*.

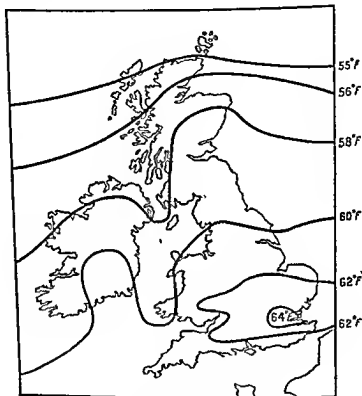


Fig. 59—July isotherms.

In the summer isotherm map (Fig. 59) the lines have a general direction from east to west, and show that the temperature is lower in the north than in the south. The reason is that the sun reaches a higher altitude in the south than in the north, just as its rays are hotter in the middle of

the day than in the early morning or late evening. When the sun sets, the temperature gradually becomes lower, but in summer the nights are



Fig 60—January Isotherms.

shorter than the days, and the heat received during the day is not all lost during the short night. In this way there is an accumulation of heat, and thus, although the sun attains its maximum altitude in June, the hottest month is

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July The lines change as they pass over land and water. The line marked 60° F shows this variation, and illustrates how the temperature of the air is lower over the sea than over the land at the same latitude even in summer time.

In winter the lines present quite a different direction, lying in a northerly and southerly position, and the highest temperature is on the Atlantic side. This happens because the water gives up its heat more slowly than the land, and is therefore able to raise the temperature of the air above it long after the land has ceased to do so.

It is this principle which causes countries on the margins of continents to enjoy more equable climates than those in the interior. Comparing the two maps it is clear that the east of the British Isles possesses a much greater range than any other part, while the south west of Ireland has the most equable climate.

EXERCISES

1. Why are temperatures reduced to sea level before making an isotherm map?
2. What kind of climate will the Isle of Man have?
3. Why is the west of the British Isles warmer than the east in winter time?
4. Travelling only in the British Isles and starting from London in what direction must I travel to find a region with the highest temperature in winter time?

VEGETATION.

The effect of climate is very marked upon the vegetation of a country. It is possible to make a vegetation map, but it would be almost impossible

to mark on it everything which grows in the country (See Fig 61)



Fig 61 —A diagram map to indicate the chief vegetation regions of the British Isles.

Vegetation can be divided so as to show those types which can endure extreme climate, those requiring warm climates, those which can endure drought, and those needing much water. Some

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need ample soil, while others can thrive with very little. Crops are often divided into root crops and corn crops. The first, which include potatoes, mangolds, and turnips, require much moisture and plenty of room at the root, for it is here they develop most. Corn crops include wheat, oats, rye, barley; in this class the greater part of the plant is above ground, because the plants need plenty of air and sunshine to ripen them, and they will generally thrive without excessive rainfall. The vegetation, therefore, depends largely upon the temperature, the soil, and the rainfall. Plants which demand much moisture flourish in the west of this country rather than in the east, provided the soil is suitable.

Winter cold in the east does not affect wheat, which is generally sown in October, ready for the following summer. Lack of soil, as on the tops of the mountains of Scotland or Wales, prevents the growth of vegetation, and even on the slopes, if the soil is poor, the only plants that flourish are heather, gorse, and poor grasses suitable for sheep.

The ascent of a mountain often forms a good lesson, since we see how the vegetation alters as the temperature becomes lower. The trees gradually change with the altitude, or as one travels northwards. In Scotland, firs and pines are more common than the elm, beech, and chestnut. They possess long, thin, straight trunks which stretch right from the roots to the top of the tree, and the leaves are thin and wiry. The oak, ash,

elm, and beech shed their large leaves in winter, and thin stems begin to branch some distance up the tree. Such trees are called deciduous.

Even grass, which is so common, is affected by the rainfall, being sometimes hard and poor, and unsuited for cattle. The best pastures are situated on the lower slopes of the hills, and in the western plains, because the rainfall is more abundant. Fruit generally thrives in sheltered parts where no severe frost occurs to kill the blossoms. Owing to its splendid pastures, which are due to the heavy rainfall, Ireland is often called the "Emerald Isle."

Animals are, as a rule, most numerous where the vegetation is best suited for them. Cattle are fed chiefly on the pastures in the west, such products as Cheshire Cheese, Hereford cattle, Devonshire cream, and Irish butter being famous.

Sheep can be fed on much poorer grasses than cattle, and they are far better climbers. Hence the Cheviot Hills, the Pennines, the Welsh mountains, and the chalk hills of South-east England are noted for their sheep.

EXERCISES.

- 1 What parts of Britain will be best suited for growing (a) grain; (b) timber; (c) fruit?
- 2 Why is Ireland so noted for potatoes?
- 3 How and why does the vegetation alter at various heights on the sides of a mountain?
- 4 What proportion of the British Isles is totally unsuited for vegetation?

MINERALS

The position of the chief coalfields of the British Isles is shown in Fig 62, which should be compared with the simple geological map, Fig 51. The coalfields are nearly always situated among the older rocks, and, generally speaking, on their outer edges. Rarely are they found among the mountains themselves, but rather at the foot, as in the Whitehaven coalfield on the outer edge of the Lake District, and in the Northumberland, Lancashire, and Yorkshire coalfields on the outside of the Pennine Upland.

All the outer edges, except the west, of the Welsh mountains contain coalfields, that in the south being the largest in the British Isles. Of the coal areas around Wales the chief are situated in Flintshire, Shropshire, Gloucester (Forest of Dean), and Monmouth. The coalfield in the south lies among mountains, hence the towns of South Wales and Monmouth are built among the hills.

The Midland coalfields are scattered; but if a line be drawn southwards from the Yorkshire field, it will connect with the Leicester coalfield. In a similar way the Lancashire coalfield is in the same line as the Stafford coalfield. The most interesting line is that along South Wales, for, drawn to the east, it touches the Somersetshire coalfield and the buried coal of Dover, while extended to the west it passes the Kilkenny coalfield in Ireland.

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The coal lies in layers or seams varying from an inch to six feet in thickness. Fossils of plants are often found in the coal, proving that mineral to be composed of the remains of trees which grew on the surface long ages ago.

Coal has aided the industries of this country tremendously, and the coal areas rank amongst the most populous parts of the British Isles.

Iron ore, the most important mineral, is often found near coal; in fact, both are sometimes obtained from the same mine.

The Scottish iron mines are in the area of the Midland Plain. An ironfield in Durham is near the coalfield, another exceptionally good one being near Barrow, on the south side of the Lake District. Iron is found on the Lancashire, Welsh, and Midland coalfields, and, as a result of this, numerous industries have been developed in the Midlands. The Cleveland hills in Yorkshire contain good mines, and, if the ridge be traced through Lincolnshire and Northampton, many neighbouring towns, *e.g.* Gainsborough, will be found engaged in making iron goods, such as farm implements, the ore being obtained from "doggers" in the hills.

Our earliest supplies of ore were obtained from the bogs of Ireland, Sussex, and the Weald, but now these bogs supply us only with peat.

Nearly all other minerals are obtained from the old rocks, hence it is commonly said, though exceptions occur, that minerals are found among mountains. This is owing to the fact that they

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Lead, limestone, and building stone are found in the Pennines. The Lake District supplies slate and granite, with coal and iron in the outside areas. Wales provides good supplies of slate from rocks older than the coal, and also copper, lead, zinc, and a little silver. The Cornish peninsula has the best supplies of copper, tin, and zinc, the minerals being found in long, thin veins in the old rocks. Most of the veins follow the axis of the peninsula, *i.e.* from north east to south-west.

Scotland contains much slaty rock, that in Argyllshire being much used. Granite and building stone are obtained from the Highlands, and other minerals will be worked in time, a little gold having been found already.

Ireland is poor in minerals. Chalk and marble, as well as basalt for road metal, are obtained in Antrim. Granite is found in the mountains of Donegal, Galway, and Wicklow, as well as in the Mourne Mountains. The Wicklow Hills have also supplies of lead, silver, and zinc. Ireland, however, contains more peat than minerals.

Some few minerals are confined to definite localities. Jet is only found near Whitby, and our chief supplies of salt come from North Lancashire, Cheshire, Worcestershire, and the district near the mouth of the Tees.

The Isle of Man provides a supply of lead, and contains some salt mines in the north. The Scilly Isles were formerly the richest in minerals of any part of this country.

EXERCISES

- 1 Measure the areas of the three largest coalfields. Why does not the size of the area determine the amount of the coal obtained?
- 2 Why are minerals generally associated with mountains?
- 3 How have minerals affected the industries of this country?
- 4 Compare the mineral maps with the geological map, and try to find out the names of the rocks in which particular minerals are most commonly found

BRITISH INDUSTRIES.

Mining for coal and iron occupies more people than that for all the other minerals together, but coal and iron have also been of tremendous use to other industries. Woollen and cotton goods were manufactured in England before coal and iron were used, the looms being fashioned of wood, and worked either by hand or by running water. Iron was extracted from its ores by means of charcoal, and thus smelting was carried on near the forests. When coal was used and the power of steam became known, the machinery was greatly improved, and at the present time British industries are generally carried on near the coal measures. Eventually electricity may make the coal fields of less importance than at present.

The iron industry has been developed in the midland valley of Scotland, at Barrow, Middlesbrough, and South Wales, where the smelting of the ore is largely carried on. Near these places, ship-building forms an important occupation, while many people are employed in making the machinery

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and in equipping the vessels for sea. Though shipbuilding is extremely important on the Clyde, other industries, such as the manufacture of cotton, woollen, linen, and silk goods, occupy thousands of people in the area of the Scottish coalfields. Woollens are largely made in the Tweed valley, and linen is manufactured in the counties of Forfarshire and Fifeshire.

At the mouths of the Tyne and Tees, shipbuilding is assisted by the coal of Northumberland and Durham, and by the iron of Durham and Cleveland.

The Barrow iron mines are also a factor in the shipbuilding industry, the coal being conveyed from Whitehaven and even more distant places such as Durham.

The Yorkshire, Nottingham, and Derby coalfield has been of immense use to the woollen industry in Yorkshire, the lace trade of Nottingham, and the large smelting, plating, and cutlery works of Sheffield.

Cotton in Lancashire has become one of the most important manufactures in the world, and the population of the country has increased rapidly. But the people are employed in a large number of industries besides cotton. Chemical works, engineering sheds, and cotton mills all require coal which is near at hand in Lancashire.

The scattered coalfields of the Midlands supply fuel for the iron works of the "Black Country," for the earthenware of the "Potteries," and for the

boot and shoe trade of Leicester and Northampton. They also assisted the silk trade of Coventry, and



Fig. 64.—Diagram to show densely peopled parts of British Isles. are now of use for the bicycle and motor car industry.

In South Wales smelting and coal mining form the chief occupations of the inhabitants, but as ores have been brought in from other districts to

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be smelted, copper works and tin plate works have been established.

Since the Scarplands of South-east England contain few minerals, no great areas of dense population occur, as in Lancashire and Yorkshire, except near London.

In Ireland, neither mining nor manufacturing occupies large numbers of the inhabitants. Farming in one form or another is the usual occupation. In the province of Ulster linen goods are made, and large shipbuilding yards on Belfast Lough provide employment, the coal necessary for these industries being obtained chiefly from Scotland. The splendid water supply is of great value in the cleansing of the linen.

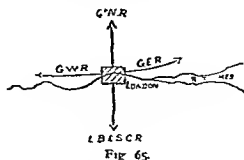
EXERCISES.

- 1 Compare the population map with the geological map and note where the population is greatest
- 2 Examine a physical map and note how few towns and villages are situated on high mountains
- 3 Why should we expect a populous area around London?
- 4 Some rivers have shipbuilding yards while others have not. Why is this?
- 5 What reasons can you give for the establishment of the following industries in their particular localities, earthenware, woollen, cotton, and bicycle making

MEANS OF COMMUNICATION.

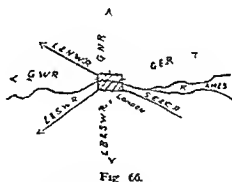
Roads, railways, and canals have been constructed in order to convey raw materials and coal to the centres of industry. It is possible to travel from the Bristol Channel to the mouths of the Mersey, Humber, and Thames, by using the canals which

link up the rivers, but this means of carrying goods is slow and used in only a few cases, railways



providing a much more rapid means of conveying the produce

The railways may be regarded as centring in London, but the map will show that though the



main lines converge on London, numerous small lines serve every district which has a large population

From London, lines run to the north, south, east, and west. (See Fig 65) These lines are known

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as the Great Northern, Great Western, Great Eastern, and the London, Brighton, and South Coast lines.



Fig. 67 — Routes to Ireland.

Other lines lie between these, such as the London and North Western with a north-westerly route, the London and South Western with a south-

westerly route, and the South Eastern and Chatham Railway which has a south easterly route



East Coast ——— Great Northern R. - - - - North Eastern R.
 West Coast ——— London & North Western R.
 Centre ——— Midland R.

Fig 68.—Routes to Scotland.

Various other lines have developed owing to the increase of trade in the localities through which they pass. Three railways connect England with Scotland, namely the London and North Western, the Midland, and the Great Northern

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Some lines connect ports like Bristol, Liverpool, Plymouth, and Portsmouth with London, and as trade increases extensions are made, a striking example of this being the Great Western line to Fishguard. This line does a considerable amount of trade in South Wales, and the American mail boats now deliver their letters at Fishguard in order to save time. From Fishguard a line of packet steamers sails to Rosslare in Ireland, to connect the English and Irish railways. A line of packets also runs from Holyhead to Kingston.

Four main lines connect Lancashire and London, the Midland and the London and North Western running as far as Carlisle, from which town they are continued by Scottish railways. The London and North Western passes through Rugby, Crewe, Preston, and Lancaster, and has branches to North Wales, Liverpool, Leeds, and Fleetwood.

The Midland runs through Leicester, Derby and Leeds, and has branches to Manchester and Bradford, with a main line from Bristol to Derby.

On the east of England the Great Northern runs through Peterborough to Doncaster, and is continued by the North Eastern Railway through York, Darlington, Durham, and Newcastle to Berwick, where the North British Railway takes over its traffic to Scotland.

The eastern counties are served by the Great Eastern Railway which connects all the towns of this part with London, and by its branches connects the eastern towns with the other main lines.

A physical map should be studied in conjunction with the railways, as it will make clear that the lines follow the river valleys and avoid the mountains, because the valleys offer the easiest routes.

In Scotland this is particularly noticeable. The Caledonian, North British, and Glasgow and South Western lines connect the English railways with Glasgow and Edinburgh by different routes, but all use river valleys as far as possible. North of the Midland Valley the North British and Caledonian run to Aberdeen, where they are both continued by the Great North of Scotland Railway which follows the coast plains to Elgin, Banff, Inverness, and Wick. The Highland Railway strikes across the centre of Scotland from Perth to Strathspey and thence to Inverness. The beautiful districts on the west of Scotland are served by branches from various railways, one terminating at Kyles of Lochalsh, a second at Mallaig, and a third at Oban.

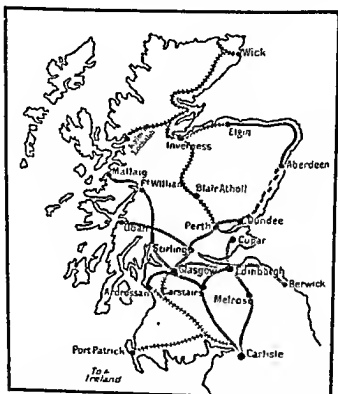
The direction of the Welsh valleys determines the routes of the railways, and in addition to the lines along the north and south others traverse parts of Wales from Hereford, Shrewsbury, and Chester.

Connecting the populous parts on the east and west of the North of England, no less than seven lines of railways cross the Pennines. But they all take the valleys, and usually tunnel the highest ground when it is not too difficult.

Dublin and Belfast, the largest towns in Ireland

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are also the railway centres. The lines have not the same difficulties as in England and Scotland,

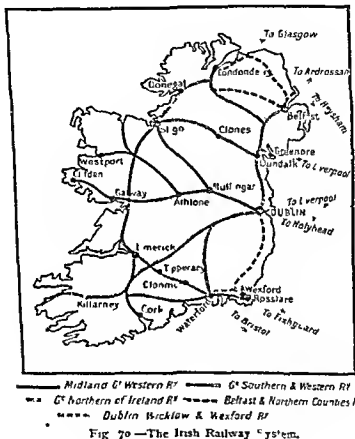


— *Nth British R^r* — *Caledonian R^r* + + + + *Highland R^r*
 — *G^t North of Scotland R^r* + + + + *Glasgow & South Westⁿ R^r*
 - - - - - *Joint line, Cal R^r & Nth B R^r*

Fig 69 — The Scottish Railways.

but a study of the route from Dublin to Cork illustrates how railways avoid the mountains. Bogs form the greatest difficulty in Ireland. Railways connect Dublin with Wicklow, Cork, Limerick,

Galway, Sligo, Londonderry, and Belfast, touching the most important towns on the route. These towns are often situated where a railway crosses a



river. The Irish lines are in connection with the railways of England, packet-steamers sailing regularly from Fishguard, Holyhead, Liverpool, Fleetwood, Heysham, and Barrow

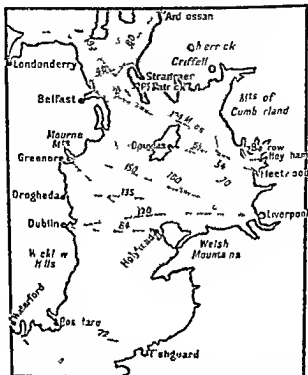


Fig 71 --Steamship communication between Great Britain and Ireland

Distances are given in miles.

Lewis—Lewis being the name given to the largest and most northerly island. North and South Uist, Benbecula, and Barra are the remaining islands



Fig. 74—The natural regions of the British Isles.

They all have very rocky coasts, and the most indented parts lie on the side of the Minch rather than on the Atlantic coast. The surface of the Hebrides consists of bare, rounded hills; but there are some plains which, if well drained, might be

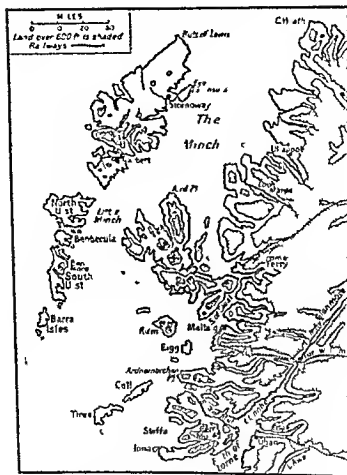


Fig 75 —The north west coast region

cultivated The climate is very damp, and the district is subject to severe gales from the Atlantic, which do not help the few farmers who live there Small streams, useful for fishing flow from the hills to the sea, in fact, the streams and the sea

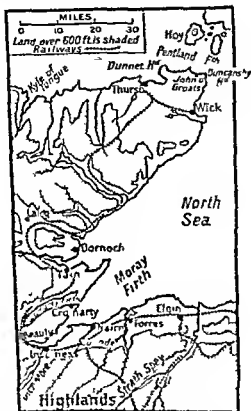
provide the most important occupation. The women knit stockings and jerseys for the fishermen, and in some parts weave a coarse woollen cloth called Harris tweed. The people are hardy and strong, but very poor, and the villages are small and scattered. Stornoway, standing on a narrow isthmus on the island of Lewis, is the largest town, and, besides being the centre of the herring fishery, has become important during recent years as a holiday centre.

NORTH WEST HIGHLANDS

The Minch and Little Minch separate the Hebrides from Scotland. The western coast of the North-west Highlands is exceedingly indented. Long arms of the sea pass right into the land, the water having filled the lower parts of the valleys, which continue still farther inland. These valleys, the result of the action of the streams, are nearly all at right angles to the axis of the mountains of the mainland. The streams are short, swift, and clear, but they become swollen in rainy weather.

The mountains are high and include Ben Hope, Ben More, Ben Dearg, and Ben Attow. Ben means mountain and More means big. Beautiful lakes lie in the valleys, the largest being Loch Shin, Loch Marce, Loch Morar, and Loch Shiel. The land is extremely rocky, and consequently bare. The wildness of the country and the severity of the weather do not permit of a

large population, since there is little employment, and much of the land is used as deer forests or



• Fig. 76 —The coast's around Moray Firth.

grouse moors. The deer forests are not woodlands, but rather stretches of stony country interspersed with heather and gorse. Roads are very poor, and only two lines of railway cross from the east to the west, both of them, as usual, following

the valleys. One line terminates at Strome Ferry and the other at Mallaig, growing watering-places on the western coast. High promontories form the main feature of the rocky coast, each promontory being the termination of a mountain chain. Where the sides of the lochs or openings are less steep, small fishing villages have been built.

The islands off the coast are often the continuation of the mountain ranges. Skye and Mull are separated from the mountains by narrow channels. Other islands are Rum, Coll, Tiree, Staffa, and Iona. The two last are small but interesting, for Staffa contains Fingal's cave and Iona the ruins of a very ancient cathedral.

The sides of Fingal's cave are composed of pillars or columns of lava, which took this peculiar form as it cooled. Such lava is found in many of these islands, and also in the north of Ireland at Giant's Causeway. Ardnamurchan Point is the highest headland, and Cape Wrath the most northerly. The east coast is better suited for agriculture, and a railway assists the farmers in removing their produce. This industry partly accounts for the growth of several small towns, such as Thurso, Wick, Dornoch, and Dingwall.

At these places fishing is the main industry, together with netmaking and boatbuilding. The red sandstone composing the sea cliffs is found farther north in the Orkney Islands, where it forms huge stacks like the "Old Man of Hoy." The inhabitants of the Orkney and

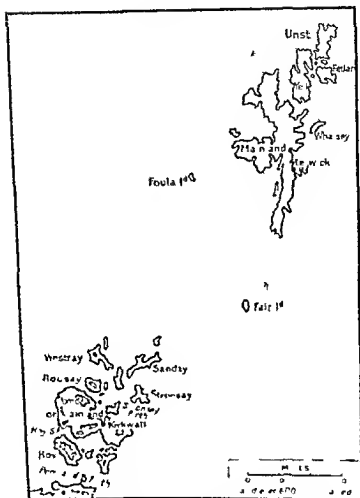


Fig 7 — The Orkney and Shetland Isles

Shetland Islands are engaged in fishing and farming but communication with Scotland is very difficult because of the rush of the tide in Pentland Firth.

EXERCISES

- 1 Draw a map of the Hebrides and the Minch. Mark the chief physical features and the positions of the chief towns.
- 2 The population of the North west Highlands is scanty. Why is this?
3. What agents are at work which affect the surface features of the North west of Scotland?
4. What are the chief natural regions of Scotland? Why is the country so divided?

SOUTH EASTERN HIGHLANDS

The South eastern Highlands are separated from the mountains in the North west by Glenmore, a valley with steep sides and containing Loch Ness, Loch Oich, and Loch Lochy, long, deep, narrow lakes with very regular shores. They receive the waters of small streams from the steep sides of Glenmore, and a canal, cut through the glen, connects the lakes, thus forming a means of communication between the seas on the east and west. The glen contains Fort William and Fort Augustus, and at its northern end stands Inverness, the largest town in the North of Scotland (*inver* means mouth).

The mass of land south of the canal is the highest and widest part of Scotland. It forms a plateau which in many cases extends almost to the coast. High mountains rise up from Glenmore like walls. The highest summit is Ben Nevis (4408 ft.), but for sixty miles east of the glen the land is rugged and difficult to cross. The high mountains, deep valleys, torrents, and lakes make this region one of the grandest in our islands. Its

surface has been grooved into valleys by the rivers which flow down to the sea, forming what is called a "Dissected plateau." The three largest

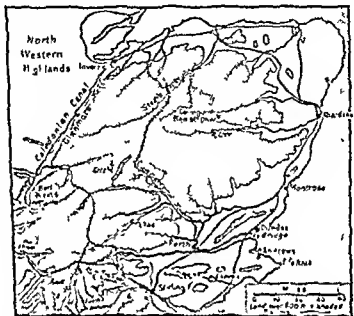


Fig 78.—The Grampian Highlands.

rivers are the Spey, the Dee, and the Tay; whose beautiful valleys afford the easiest means of crossing the plateau, and are, besides, the only place suitable for habitation. Strathspey (strath means plain or wide valley) extends far into the plateau, and separates the mountains, drained by the river Findhorn, from the great granite mass on the east, which includes the mountains of Cairngorm, Cairntul, and MacDhui. From the centre of this mass the Dee has worn a valley to the east,

in which are situated Ballater, Balmoral, and Braemar, with Aberdeen at the mouth (*aber* means mouth) On the south side of the Grampian Highlands, the valleys of the Tay and the Tummel, together with Glen Garry, offer a route to Strath-spey along the Pass of Killiecrankie. Besides these larger valleys, the torrents have worn out deep, gloomy glens, leaving rocky masses of moorland sparsely dotted with patches of heather

Some valleys contain trees, chiefly birch and fir, and are rendered more beautiful by torrents and lakes Sometimes the valleys open out to the sea, as at Loch Leven and Loch Etive near the latter is Oban, one of the beautiful western watering-places Argyllshire and West Perthshire are perhaps the most beautiful districts, and the mountains include Schiehallion, Ben Lawers, Ben More, Ben Cruachan, Ben Vorlich, and Ben Lomond The lakes include Loch Lomond, Loch Awe, Loch Rannoch, Loch Tay, Loch Earn, and Loch Katrine The Trossachs is the name given to the picturesque valley containing Loch Katrine and Loch Vennachar, and the pass continues from Callander to Loch Lomond

The Grampian Highlands cannot maintain a large population There is not much employment, because the land is difficult to cultivate, and therefore little food can be grown Quarrying for granite and building stone occupies a few people, while others are engaged in planting and cutting trees, or in the preservation of game The

villages are situated generally at the entrances to the valleys, or along the railway route from Perth to Strathspey. The plain to the south coast of Moray Firth is largely cultivated, and towns like Banff, Elgin, and Nairn are markets, being connected by rail with Inverness and Aberdeen. Peterhead, a fishing centre, is also noted for its shipments of stone. Aberdeen is an old town with various manufactures. It possesses a university, and is an important railway centre. The towns on the south western lochs are holiday resorts, the chief being Oban, Inveraray, and Ardrishaig. Several are connected by rail with Glasgow and Edinburgh, and steamboats ply regularly to the western lochs in the summer season.

EXERCISES

1. Draw a map of the Grampian Highlands showing the height of the ground and the chief railway routes.
2. What industries are carried on in the South-east Highlands?
3. Describe the Trossachs.
4. Measure the area of the Grampians by means of squared paper and compare the area with that of the whole of Scotland.

SOUTH SCOTLAND.

THE LOWLANDS

The southern half of Scotland is separated from the north by the edge of the mountainous country, which, standing like a wall above the plain, stretches in a north east to south-west direction. The rocks of the northern half are entirely different from those in the south, and the line of division is known as a *fault* (See Fig 79) The southern



Fig 79—Fault.

division is sometimes called the Lowlands but it is not all low land, for if a line be drawn from Dunbar on the east coast to Ayr on the west, it will separate the Southern Uplands from the Midland Plain of Scotland. Even the Midland Plain is not without hills, which, from the island of Arran to Forfarshire, form a chain containing the Renfrew Hills, Campsie Fells, Ochil, and Sidlaw Hills. None of these can compare with the mountains of the North. This lowland region contains the estuaries of the Clyde, Forth, and Tay, and is the most populous part of Scotland.

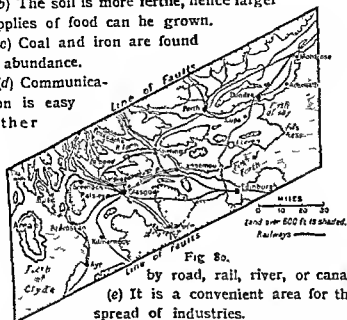
The reasons for the large population are as follows:—

(a) The climate is less extreme in the lowlands than it is in the north.

(b) The soil is more fertile, hence larger supplies of food can be grown.

(c) Coal and iron are found in abundance.

(d) Communication is easy either



by road, rail, river, or canal.
(e) It is a convenient area for the spread of industries.

The estuaries of the Forth and Clyde approach within thirty miles of each other. Strathmore, part of which goes by the name of the Carse o' Gowrie, stretches between the Sidlaw Hills and the Grampians, and forms a great fruit and grain area. The fruit grown on this plain has assisted in the growth of Dundee. Dundee, Arbroath, Montrose, and Forfar are noted for the manufacture of linen, the flax having formerly been grown on the adjoining hills. Dundee, the third town in Scotland,

contains shipyards and jam works; while its manufactures of ropes, twine, sailcloth, and carpets rank amongst the largest in Europe. Perth is built where the river Tay forms a gap or break in



Fig. 81.—Industrial Scotland.

the hills. It is noted for its dyeworks, the waters in this district being very suitable for dyeing purposes. It is also a railway centre—one line running northward over the Grampian plateau, and a second southward from Aberdeen to Perth, Glasgow, and Edinburgh.

INDUSTRIAL SCOTLAND

At Scone, to the north of Perth, the Scottish kings were crowned in former days. Fifeshire is a hilly peninsula between the firths of Tay and Forth. It has made much progress since the erection of bridges allowed the running of a railway from Edinburgh to Dundee. Cupar is its capital, and, though the country contains rich agricultural land, coal and iron mines form its chief wealth. St Andrews has an ancient university.

The Forth estuary begins near Stirling, and on its north bank stand Alloa and Kirkcaldy, with Dunfermline a few miles away. Coal mining and iron smelting form the chief occupations, but there are also manufactures of linen, linoleum, and oil-cloth. On the south side of the Forth the district called the Lothians provides rich farming country, and there are also some coal mines.

Edinburgh, the capital of Scotland, is said to have one of the finest positions in Europe, being at the foot of high, rocky hills. It grew up round its castle or fort, but is now not only a military centre, but a noted place for brewing and distilling, as well as for the printing and publishing trade. Its streets and public buildings are extremely attractive, and the town possesses a university, cathedrals, museums, a palace, and a castle. The peculiar properties of the water gave rise to the brewing trade. The railway from Berwick follows the coast to Edinburgh, and then

.

passes on to Dundee, and Aberdeen. Leith is the port of Edinburgh.

At the entrance to the Firth of Forth is the Bass Rock, and at the entrance to the Firth of Tay the Bell Rock, standing like sentinels to guard the estuaries.

Like the Firth of Forth, the Firth of Clyde has largely assisted the growth of the towns, and it is proposed to construct a ship canal between the two firths to increase the trade still further.

The Clyde allows vessels to enter far into the interior, and its banks are lined with the finest shipyards in the world. Glasgow, the largest town, was built a long way up the river to lessen the danger of invasion, and at a spot where the stream could be crossed easily. Now the Clyde has to be dredged in order that large vessels may reach Glasgow. Besides shipbuilding yards, there are engineering shops; cotton, woollen, and silk mills, iron smelting furnaces, and printing works. Tobacco, sugar, and oil are imported, and factories for the manufacture of tobacco have been created.

Ayr, serves as the outlet for this coalfield. The Firth of Clyde is noted for numerous watering-places, the chief being Dunoon, Rothesay, and Lamlash, in the Isle of Arran. To these places boats sail regularly from Glasgow, Greenock, and Ardrossan. Numerous railways serve the Midland Valley of

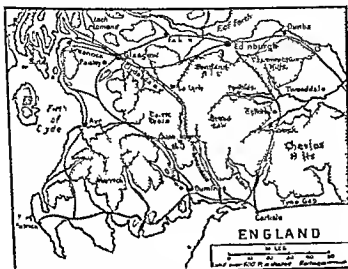


Fig. 82.—The Southern Uplands

Scotland, nearly all being branches of the Glasgow and South Western, the Caledonian, or the North British lines.

The *Southern Uplands* is the name given to the high land in the south of Scotland. They are composed of hard, crumpled slate with some granite. Rounded hills covered with heather, moss, and coarse grass are the most common, but the lower slopes and the valleys provide rich pasture

for cattle. Numerous valleys have been worn out by the rivers, the chief being Clydesdale, Tweeddale, Eskdale, Annandale, the names being derived from the rivers. The railways have taken advantage of some of these 'dales on the way from England to various Scottish towns.

Several peaks, including Merrick, Queensberry, Hartfell, and Broad Law are over 2000 feet high. The name Lowther or Lead Hills is applied to the central mass, the name referring to one of the most important minerals found, granite and slate being the others. On the north side of the Uplands are the Pentland, Muirfoot, and Lammermuir hills.

The peninsula, lying to the extreme south-west of Scotland, with Corsewall Point on the north and the Mull of Galloway on the south, is known as the Rhinns, and is shaped like a hammer head.

EXERCISES

- 1 What reasons are there for the establishment of the woollen industry in the Tweed Valley?
- 2 Communication is easy in the Midland area of Scotland. Why is this? How are the railways linked with those of England and the North of Scotland?
- 3 Why is the Midland region the most populous part of Scotland?
- 4 What are the principal industries of central Scotland? Account for their establishment in certain parts.

ENGLAND AND WALES

The Cheviot Hills are really a continuation of the Southern Uplands of Scotland, and the boundary between England and Scotland lies across them. The hills are rounded in shape, and the grasses on the slopes provide some of the finest sheep pastures in the British Isles. The *Border Country* was the scene of almost continual warfare in the past. Separating the Cheviots from the Pennines is the Tyne Gap, along which the South Tyne flows. It is a famous line across the North of England, for here, in olden time, the Emperor Hadrian built a wall from Carlisle to Newcastle, to defend Roman Britain from the invasions of the northern tribes, and in later days roads and a railway have been constructed by this route from east to west.

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The rivers were formerly the only means of driving the machinery of the corn mills and woollen factories, the latter being supplied with wool from the sheep which fed on the adjoining hills. The valley of the Tweed was particularly famous for its woollen mills, and the name "Tweed cloth" has, for

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THE PENNINES

This upland region is sometimes called *the backbone of England*. In no place do the mountains reach 3000 feet in height. It is highest and widest in the north, and extends from the Tyne Gap to the Trent area. For many years this hilly country was a barrier between the east and the west of England, but the valleys formed by the rivers are now traversed by roads and railways, no fewer than seven rail ways crossing from one side to the other. Half way along the Pennines is the Aire Gap, low land used by the Midland Railway and by the Leeds and Liverpool Canal. Few towns are situated on the high land, but some of the valleys constitute the most populous parts of England.

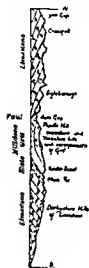


Fig. 83

Often the hills are rounded in shape and consist only of moorland, with poor grass, gorse, heather, and few trees.

The streams flowing down each side of the chain, which has been folded into an arch, have formed numerous beautiful valleys, such as Ribblesdale, Wharfedale, and Alredale. The rivers have also been of great value in helping to develop local industries. Amongst the peaks in the northern part of the Pennines are Crossfell, Wharfedale

Ingleboro', Pen y ghent, near the Aire Gap is Pendle Hill, and at the southern end is the Peak

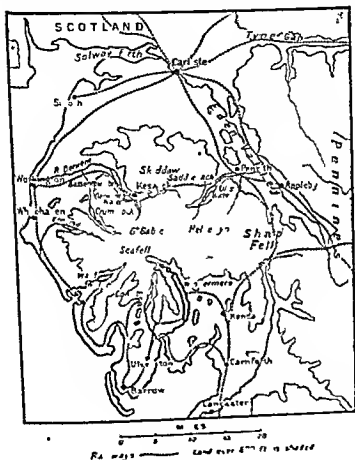


Fig 84 —Lake District.

district, with Kinder Scout the highest point. Much beautiful scenery can be found in the Pennines, particularly in the limestone country in

the north and the south. The central Pennines are bare, bleak, dark-looking hills, but as they are the lowest and narrowest part of the system, the routes between Lancashire and Yorkshire are fairly easy.

THE LAKE DISTRICT

Joined to the Pennines by Shap Fell is a mass of mountains which consists of a series of chains

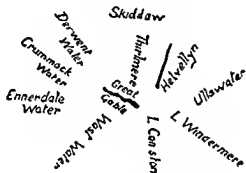


Fig 85.—Wheel like arrangement of the Lakes.

radiating from a centre like the spokes of a wheel (see Fig 85). These mountains contain the highest peaks in England, *e.g.* Skiddaw, Helvellyn, Scawfell, and Conistone Old Man. The area is generally known as the Lake District because the valleys between these radiating chains contain a number of beautiful lakes. The high, pointed peaks, the beautiful, clear streams, the deep, calm lakes, the well-wooded slopes of the hills all combine to make this district a noted holiday resort. The

largest lakes are Windermere, Coniston, Ullswater, Wastwater, Derwentwater, Bassenthwaite, and

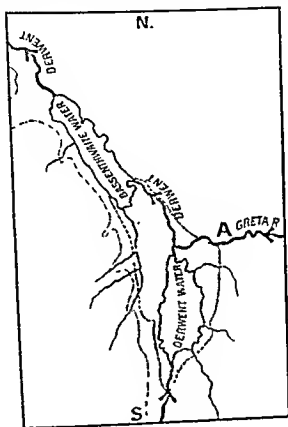


FIG 85

Delta of Greta shows the fast current

Thirlmere. Derwentwater and Bassenthwaite were formerly one large lake, but the river Greta which flowed into it gradually formed a delta with the silt it carried, and cut the big lake into two parts.

124 British Isles—Natural Divisions

On the Delta at the present time is the tourist centre—Keswick

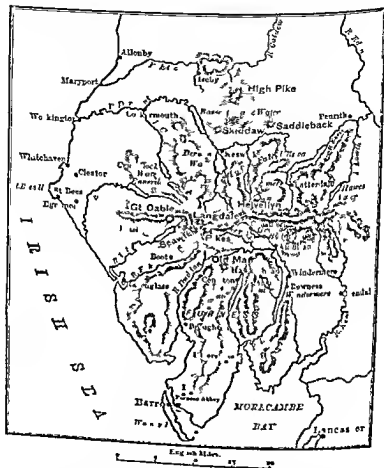


Fig 87—Lake District showing mountain spurs.

Besides being the highest part of England, the Lake District is also the rainiest, but this does not help farming, because the hill slopes are too steep

and the valleys too narrow. Sheep feed on the hills, and the wool is used in the woollen mills at Kendal.

Though Shap Fell links the Lake District to the Pennines, two valleys almost cut it off from these hills, one drained by the River Eden which flows northwards, the other by the River Ribble which flows to the south. Carlisle, situated on the Eden plain, occupies a splendid position for a fortress. The Romans established a station here, because at this spot the road from east to west crosses the road from north to south. Carlisle contains a castle, and is a military centre. It is also a railway junction where the English and Scottish lines join, the passengers being conveyed from London to Glasgow and Edinburgh without change of carriage.

On the outer rim of the Lake District coal and iron are found. Whitehaven and Maryport are the coal mining centres, and Barrow is noted for the smelting of iron ore, which is obtained in the district. The iron work has aided the engineering and shipbuilding industries at Barrnw. Ulverston and Carnforth also possess smelting furnaces.

LANCASHIRE AND CHESHIRE PLAIN

To the south of Morecambe Bay and west of the Pennines extends the low land of the Lancashire Cheshire plain, across which the Lune, Wyre, Ribble, and Mersey flow. It is good agricultural



Fig 83.—Lancashire Cheshire Plain.

and, and provides rich green pastures for large herds of cattle. Cheshire and the Fylde are noted for cheese.

Spurs of the Pennines stretch into this plain, forming Bowland forest, between the Lune and Ribble valleys. Rossendale forest separates the Blackburn Burnley valley from the Manchester cotton district. Coal, which is abundant on both

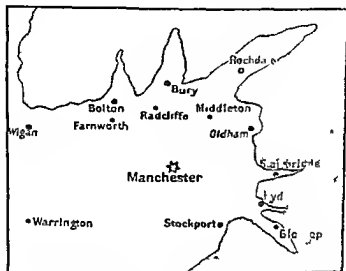


Fig 89 —Diagram to show the relation of the towns of Lancashire to the hilly country around

towns, but Colne, Burnley, Accrington, Blackburn, and Preston also manufacture cotton. Most of them possess engineering works for making the machinery necessary for this manufacture.

St Helens, Runcorn, and Widnes have chemical works, while Warrington contains soap works and wire mills. Near Stockport a considerable felt hat industry is carried on. Wigan is noted for coal-mining as well as for its manufactures. Preston is regarded as the handsomest of the cotton towns; it is also a port, and has timber yards and soap factories. Liverpool, however, is the largest port (see Part II). In the middle of the Cheshire Plain and also near Fleetwood are rich beds of salt, which account for the chemical works in the neighbourhood. Between the estuaries of the Dee and the Mersey extends a tract of rich farming country known as the Wirral. Birkenhead, opposite to the Mersey, is a large port and has many shipyards.

of unloading at Liverpool. The dampness of the climate and the streams thus caused, formerly made Lancashire a boggy, useless district, but these things now make it well suited for the cotton manufacture. The county is also wonderfully supplied with the means of bringing in the raw material, and carrying away the manufactured goods.

EXERCISES.

1. "The Pennine Chain forms a barrier between the east and west of northern England" How far is this true? What are the chief routes through the Chain?
2. Describe the scenery of the Lake District, marking on a map the names of the chief physical features.
3. Describe the cotton district of Lancashire. Account for the development of the railways in this part.
4. What kind of material would most likely be found on the boats which use the canals of Lancashire and Cheshire?

EASTERN PLAINS.

On the east of the Pennines, low lands extend to the coast of Northumbria and, in a southerly direction, to the Midland Plain, taking in the Vale of York and the Trent Valley. These low lands are linked with Lancashire at the Aire Gap, through which a canal passes by the "Nick of Pendle" from Liverpool to Leeds, and the Midland Railway crosses to Hellifield and Carlisle. The coalfields of Northumberland and Durham, together with the iron mines of Durham and Cleveland, have caused various industries to develop at the mouths of the rivers. The areas at the mouth of the Tyne and the Tees are

FIG. 1

extremely populous, and shipbuilding, engineering, mining, and smelting are the principal occupations. The northern group of towns includes Newcastle, Gateshead, Jarrow, North Shields, South Shields, Tynemouth, and Blythe. The southern group



Fig 90.—Tyne ports.

near the Tees mouth includes Hartlepool, Stockton, Darlington, and Middlesbrough. The low lands, away from the industrial centres, are well suited for agriculture. The Vale of York, a splendid farming district, lies between the Pennines and the hills

which shut it off from the North Sea. It is drained by the Ouse, and a railway from the south follows the route of the old Roman road through York to the north.

York, a walled town with a fine cathedral, is a military centre, and is also noted for its confectionery works and breweries. The valleys between the spurs of the Pennines are very beautiful, and are drained by tributaries of the Ouse, the chief of which are the Swale, Ure, Nidd, Wharfe, Aire, Calder, and Don. Lower down the valleys are the towns engaged in the woollen industry, the cloth being sent to Bradford and Leeds. Leeds is a large town with a university. It manufactures woollen cloth, and has mills for

and it is probable that the Leicester coalfield is a southerly extension of that of Yorkshire

Rotherham and Chesterfield are the mining centres, but Sheffield, Doncaster, and Penistone are also on the coalfield. Sheffield is now the largest town in Yorkshire, having attained to this position on account of its iron trade. It is engaged chiefly in the making of ship plates, guns engines, and boilers, but its fame is due chiefly to its cutlery and silver plating. It has a university.

The Trent, which rises west of the Pennines, serves as a boundary to the Pennine area. The river drains the Potteries, the Burton brewing district, and the Nottingham lace county, finally entering the Humber estuary. Its tributaries include the Dove, Derwent, and Tame. The Potteries is a district famed for its earthenware manufacture, and the towns of Hanley, Burslem and Stoke are now amalgamated. Stafford is a railway centre as well as a pottery town.

Owing to the waters of the district, Burton is famous for its breweries. Derby and Belper manufacture cotton, but Derby is also a depot of the Midland Railway. Nottingham contains lace mills and hosiery factories obtaining coal from the area around Mansfield. Retford and Doncaster are important railway towns.

The hills which separate the York plain from the sea known as the North York Moors and the Yorkshire Wolds, are divided from one another by the Vale of Pickering. The moorlands of

North Yorkshire are often called the Cleveland Hills, and are noted for iron ore. The same kind of rock may be found continuing across England, and various small towns along this chain of hills are engaged in the working of iron. Whitby, Scarborough, and Filey are coast watering-places, Whitby being noted also for its jet. The chalk hills terminate on the coast, and the huge white cliffs forming Flamborough Head are the home of thousands of sea birds. The clays north and south of this cape are softer than the chalk and more readily worn away by the sea. A glance at the map



Fig. 92.—The Humber

will show what effect this has had upon the configuration of the coast. Quite different from Flamborough Head is Spurn Point. This is the end of a long, low sandy peninsula known as the Holderness, and the district is noted for horse breeding.

Hull is the chief port of Yorkshire and shares the continental trade with Leith, Newcastle, and London. It trades with Hamburg, Copenhagen, and the ports on the Baltic, exporting coal, manufactured cotton, woollen, and iron goods, and importing timber, flax, hemp, oil, and dairy produce.

the centres of industry, are pastures and fruit gardens, and this is particularly the case in the valleys of the Severn and the Avon. Stratford (Shakespeare's birthplace), Warwick, and Leamington are largely visited by tourists. In the Malvern Hills several granite quarries are worked.

Malvern possesses a public school, and receives numerous visitors on account of its waters, which have medicinal value. Worcester county contains salt mines, and Kidderminster is famed for its carpets. At the foot of the Welsh mountains stretches the plain of Hereford, noted for farming and fruit growing. The western limit of the Midland Plain is a border country, formerly known as "the marches", Chester, Shrewsbury, Ludlow, and Hereford were military centres from which expeditions started into Wales.

Other towns in the Midlands have special industries. In addition to its famous public school, Rugby has electrical engineering works. Leicester manufactures hosiery, silk, boots, and shoes. At Coventry, large works for the manufacture of motor cars and bicycles have been established.

The Severn Gate forms the outlet for the Midlands in the south west, and Bristol ranks as one of the largest ports in England. Its extensive trade is carried on with America and West Africa, oil, seeds, fruit, timber, and tobacco being largely imported.

SOUTH EAST ENGLAND

An irregular line drawn along the mountains from Flamborough Head to Start Point, separates the region of South east England from the South west, and the Midland Plain. The hills lie in long lines and are composed of chalk or limestone, which is harder than the clays of the plains, separating the ranges. The peculiar formation of the hills accounts for the name *Scarplands* being given to the region (see Fig 53). They seem to radiate from near Salisbury Plain, and extend North east, East, and South east, forming long lines amongst which are the Cotswold Hills, Northampton Heights, Chiltern Hills, Gog-magog Hills, East Anglian Heights, the Downs, and the Dorsetshire Heights. To the North east of the Berkshire Downs, a long length of plain stretching to the Wash, provides some of the richest farm land.

The southern part is drained by the earlier tributaries of the Thames, namely the Cherwell, Evenlode, Windrush, and Thame. In the middle of this basin stands the city of Oxford, with its colleges, libraries, museums, and cathedral. The Thames has made a gap in the chalk below Wallingford known as Goring Gap, whence it flows along the lower valley to the sea.

Near Buckingham, the rivers begin to flow toward the Wash, and though the district is entirely agricultural there are several market towns for collecting the farm produce. Peterborough,

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EXERCISES

1. Account for the large number of towns around the mouth of the Tyne and the mouth of the Tees
- 2 Name the chief towns engaged in the woollen trade From what places is the raw product obtained?
- 3 Draw a map of the Ouse-Trent basin, marking the principal masses of high ground and naming the towns
- 4 Railways, roads, and rivers cross the Vale of York. Illustrate this on a rough sketch map

THE MIDLAND PLAIN.

This region is formed by the union of the two plains which lie on the flanks of the Pennines. It is drained by the rivers Trent, Tame, and Avon, and the action of these rivers has made the area distinctly unlevel. It is roughly triangular in shape, with outlets at the Cheshire, Trent, and Severn gates, and its south-eastern side is bounded by the escarpment running from Lincoln to the Cotswold Hills. The plain contains many picturesque places as well as great centres of industry. On the west it may be said to extend to the Welsh mountains, and it includes part of the basins of the Severn and the Dee. Coalfields occupy a portion of these basins in Flintshire, Shropshire, and Gloucester, and are naturally a great aid to the industries.

Birmingham, the largest town in the Midlands, is the capital of the *Black Country*, a name given on account of the hardware industry which is carried on. Birmingham manufactures all kinds of iron goods, from engines to pens and pins.

most of the articles, even the smallest, being such as employ many people to manufacture. The town has a university, a museum, and a

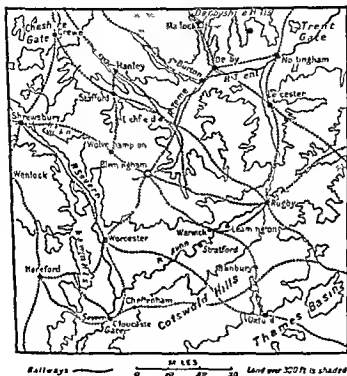


Fig. 93.—The Midlands.

large picture gallery. It is also the seat of a bishop.

The neighbouring towns (Wolverhampton, Bilston, Dudley, and Walsall) are nearly all engaged in some branch of ironwork, the Warwickshire coalfield providing the fuel. On the low lands, away from

Huntingdon, Cambridge, and Ely are the most important Cambridge contains various colleges forming a university like that at Oxford, while Peterborough and Ely have cathedrals

The Fens is the name given to the low, flat plain around the Wash It is so flat that the rivers scarcely seem to move across it, and it was formerly bogland, where the monks of Ely found refuge in troubled times Northampton, on the Nen, is noted for its manufacture of boots and shoes Bedford, where John Bunyan spent many years of his life stands on the Great Ouse

EAST ANGLIA.

This includes the counties of Norfolk and Suffolk, and extends from the Fens to the North Sea.

It is fairly level, and forms one of the richest grain districts in England The climate is moderately dry, and the soil is a mixture of lime, sand, and clay The district is sometimes called *Poppyland* Norwich the largest town, is very old and at one time was the largest manufacturing town in the British Isles Even now it has its manufactures though not so many as formerly Boots and shoes mustard, starch, and hosiery are the chief The town has a cathedral and is an important railway centre Many watering places including Hunstanton Cromer, Lowestoft, and Yarmouth, are dotted along the coast. Lowestoft and Yarmouth are also important on account of

EXERCISES

1 Why is one part of the Midland Plain sometimes called the Black Country? What are the chief industries carried on? What is the cause of these industries?

2 Draw a map of the Severn basin.

3 Describe the Fen country

4 Mark on a map the ridge of hills from the Cotswolds to Lincoln. Mark the position of the chief towns on each side of the ridge and name the railways which pass through the gaps in the hills

THE LOWER THAMES VALLEY

After leaving Goring Gap the Thames flows through a beautiful wooded valley, which gradually widens toward the sea in the east. Some portions of the valley are entirely agricultural, and grain, fruit, and flowers are grown. Other parts are centres of industry, the district around London being the most thickly peopled in the world.

Reading has a university college, and the town is also noted for its seeds and biscuits. Sandhurst has a military college, and Aldershot is a training camp for soldiers. Windsor possesses a famous castle, the residence of the English sovereign. In its chapel the later rulers of Britain are buried. Across the river from Windsor is Eton, with its famous public school for boys. Near London are various residential towns established chiefly for the convenience of city business men.

London was built around the famous bridge across the Thames, as this for many years was the only means of crossing the river on foot. It

is situated in the centre of a basin which opens to the North Sea, opposite many important rivers of the Continent. London, including the suburbs, contains a population of over 7,000,000, and is the largest city in the world. It is the seat of the

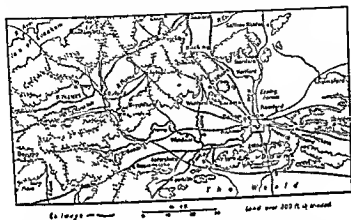


Fig 95 —The Thames Basin

British Government, and contains palaces, Government offices, Houses of Parliament, cathedrals, colleges, museums, art galleries, theatres, and banks, among which are some of the finest in Europe. The railways also make London a centre, and its trade, by railway, road, and sea, is enormous. Vessels arrive at the mouth of the Thames from all parts and unload their cargoes at Tilbury, Port Victoria, and London docks.

The produce brought by these vessels has led to the large number of industries on the banks of the river. The *west end* is the home of the wealthy, the *east end* being the industrial part.

South of the Thames, chalk Downs again occur, and the plains between the ranges of hills are generally used for grain-growing, or for providing vegetables, fruit, and flowers for the London markets. The North Downs stretch along the south side of the river, terminating on the coast of Kent; the South Downs lie along the south coast and terminate at Beachy Head in Sussex.



Fig. 96 —Map of the Weald Country

The hills provide valuable sheep pastures, the grasses, on account of lack of moisture, being too poor for cattle. Owing to the poor soil, few trees grow on these chalk hills. The ranges are broken by gaps, which have been made by the rivers, and these passages assist the construction of roads and railways. Along the routes from London to the coasts of Kent and Sussex, many towns, the largest of which is Croydon, have grown up. Canterbury, beautifully situated, has a

fine cathedral, and is the seat of the Primate of England. Tunbridge Wells is an inland resort with medicinal springs. Rochester, a cathedral city, contains large cement works. Chatham is noted for its dockyards. Many watering places and pleasure resorts, such as Ramsgate, Margate, Brighton, and Eastbourne, have sprung into importance, and there are also packet stations like Dover, Folkestone, and Newhaven.

The plain between the North and South Downs is known as the Weald, because it was formerly a forest. A low ridge of hills runs through the middle, and from the heights on its south side it is possible to see the coast of France.

HAMPSHIRE BASIN

The arrangement of the chalk hills causes a basin-like area to the south of the Berkshire Downs. The materials of which it is composed, and their arrangement, make it much like the London basin. In the middle of the ring of bare chalk hills lies a fairly flat country occupied by farms and gardens.

The New Forest forms one part, and the Isle of Wight, though separated from the mainland by Spithead and Solent, really belongs to this basin. From these channels a third extends into the interior and is known as Southampton Water. At its head stands Southampton, a port trading with all parts of the

world. Portsmouth is a naval arsenal as well as a port. Winchester and Salisbury are cathedral towns, and at one time Winchester was the capital of England. The Itchen, Avon, Stour, and Frome flow from the chalk Downs across the basin to the sea. Several prominent headlands, due to the harder rock withstanding the

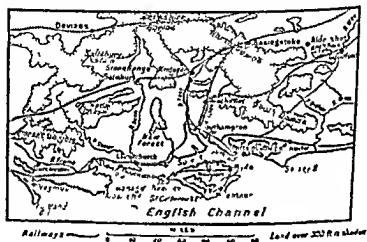


Fig. 97.—The Hampshire Basin.

rough seas better than the sands and clays, mark the coast line. Portland Bill, St. Alban's Head, and St. Catherine's Point are the most prominent capes, but the Needles—a series of stacks—are better known. The Needles form a continuation into the sea of a hard band of rock which stretches across the Isle of Wight. Bournemouth, Poole, and Weymouth are noted watering-places. From Weymouth and Southampton, boats sail to

the Channel Islands, Jersey, Guernsey, Alderney, and Sark—a group of rocky islands with very beautiful scenery. These islands contain pastures

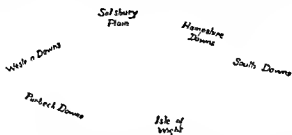


Fig. 93—The arrangement of the chalk hills around the Hampshire Basin

for cattle, fruit and flowers are grown there, and sent to England, earlier than they can be grown on the mainland.

EXERCISES

1. What is meant by the Weald of Kent? Name the chief occupation of the people in this district.
2. Draw a map of the River Thames marking the position of the hills near it and the chief towns in its basin.
3. Find out from a map —
 - (a) Towns in the British Isles which are near the same line of longitude as Birmingham.
 - (b) Towns in the British Isles which are near the same line of latitude as London.
4. Draw a map of the coast line from London to Bristol, and mark the positions of the chief ports and watering-places. Show on the map how these places are connected by rail with London.

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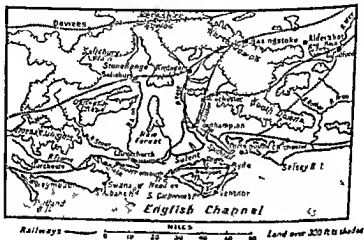


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granite, while Cornwall and the Scilly Isles contain tin and copper mines. Dartmoor has a noted jail, from which escape is difficult, as it is surrounded by boggy country and the district is destitute of towns or railways.

Being the most southerly part of the British Isles, and receiving the warm moist winds from the Atlantic, the plains and valleys of this region provide exceedingly rich land for vegetation. Fruit is largely grown, and in summer the lanes are thick with flowery hedges. The green fields provide good pasture for cattle, Devonshire being famous for its cream. The finest districts are the Vale of Taunton in Somersetshire, and the Vale of Devon. Along these wide vales or plains the railways pass from London to the port of Plymouth and the lovely watering-places on the coast, among which are Ilfracombe, Padstow, Penzance, Falmouth, and Torquay.

Exeter is an ancient city with a cathedral, and here the London and South Western Railway crosses the Great Western. Numerous rivers, including the Exe, the Tamar, the Torridge, and the Parret flow through the plains. On the Parret stands Taunton, an agricultural centre, in the middle of the Somersetshire Plain.

Plymouth and Devonport owe much of their importance to the dockyards, but Plymouth is also a port from which vessels sail to South Africa and Australia. Railways connect it with all parts of England, one line proceeding still farther south.

THE WEST OF ENGLAND

The land between the Bristol Channel and the English Channel includes the counties of Cornwall and Devon, and is generally known as the Cornish Peninsula



Fig. 92.—The Cornish Peninsula.

It consists of hills and plains and with its beautiful scenery, is regarded as one of the finest parts of Britain. The high land consists of rounded moorlands, often boggy, and bare of trees. In the north is Exmoor, and a little farther south is Dartmoor, from which a chain of moorlands extends south westwards to Lands End and the Lizard. Some of the moorlands are quarried for

granite, while Cornwall and the Scilly Isles contain tin and copper mines. Dartmoor has a noted jail, from which escape is difficult as it is surrounded by boggy country and the district is destitute of towns or railways.

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to Penzance, the routes taken to avoid the hill country being interesting. Truro is a cathedral city.

WALES

To the west of the Midland region is a land of mountains, known as Wales. The numerous mountain chains run more or less parallel to one another, the direction along which they lie being shown by Llyn Peninsula.

Wales is bounded on the north by the Irish Sea, on the west by St. George's Channel, on the south by the Bristol Channel, and on the east by the low lands, along the basins of the Severn and the Dee. It is often spoken of as the *Principality of Wales*, because its nominal ruler is the Prince of Wales.

coalfield—the largest and richest coal area in this country. Iron is found near the coal, and the mining and smelting industries, together with shipments of coal and iron from the ports, occupy a large number of the inhabitants. Merthyr Tydvil, Rhondda, and Ebbw Vale are the largest inland towns, but Swansea, Llanelly, Barry, Newport, and Cardiff are better known, being either smelting centres or ports from which the materials are



Fig. 100.—The Bristol Channel.

exported. This large coalfield is continued into Monmouth and Gloucester, and owing to the position of the mines the towns and villages are generally situated on the hills rather than on the low land.

Other parts of the Welsh region are noted for coal, but the great mass of the rocks consists of material much older than coal. Slate is quarried in many places the best known quarries being at Festiniog and Bethesda.

Tin, copper, lead, and a little silver and gold are found in Wales

The hills provide food for vast flocks of sheep, and flannel mills have been erected at Newtown and Welshpool, where the waters of the Severn were used for driving the machinery. The Clwyd, Conway, Ystwyth, Teifi, Towy, Taff, Usk, and Wye, as well as the Severn and Dee, are the chief rivers. Bala Lake lies in the valley of the Dee. In many valleys, holiday resorts, such as Llangollen and Llandidrod Wells, have been established. Very little of Wales is low land, and consequently neither agriculture nor dairy work flourishes, except in the valleys or on the outer plains. Anglesea, being flatter and possessing good soil, was formerly the grain county of Wales.

The way in which the railways follow the north and south coasts or run through the chief valleys from centres like Chester, Shrewsbury, Hereford, and Bristol is particularly instructive. To many the coast is the most charming part, because of the mountains, the rocky shores making the scenery very grand.

Western steamers ply regularly to Rosslare near Wexford. Mails are carried along both routes.



F g 101 --Isle of Man.

ISLE OF MAN

From the Isle of Man it is possible to see the mountains of Scotland Ireland Wales and England. The island is over thirty miles long and about twelve miles broad. It is mountainous in all parts. At the extreme north the highest

peaks being Snaefell and South Barrule. Across the middle of the island stretches a valley which is used by a small railway from Douglas to Peel, the other lines running between the mountains and the sea, to Ramsey in the north and Port Erin in the south. The lovely scenery, both coast and inland, attracts crowds of holiday makers from England and Scotland. The south coast is marked by a series of stacks and skerries. The Manx people have a language of their own and some exceedingly quaint customs. At Peel is a cathedral supposed to have been founded by St Patrick. Steamers sail regularly from Liverpool, Fleetwood, Heysham, and Barrow carrying passengers, provisions, and mails.

Fishing occupies many of the people, and the valleys and plains are cultivated. The Isle of Man enjoys the privilege of electing its own "House of Keys."

The Calf of Man is a small island off the coast.

EXERCISES

1. What are the chief occupations of the people in Cornwall and Devon? Account for these occupations.

2. 'Wales is a land of mountains.' Describe the scenery of North Wales.

3. Draw a map of the Irish Sea, marking the position of the Isle of Man, the principal packet-stations, and the routes across the sea.

4. Describe the South Wales coalfield. Why is it so populous? What are the leading railways? Mark on a map the route from Bristol to Fishguard.

is not due to physical features, but rather to the power of the kings, the strongest being able to conquer other parts and thus enlarge his own estate. It is, however, more convenient to study Ireland according to its physical features than in provinces.

The mountains are in two belts, one across the north, the other across the south, and between these extends a plain more level than any other part of the British Isles, no elevation being higher than five hundred feet.

NORTH IRELAND.

A system of highlands stretches across the North of Ireland, the general direction being from north-east to south-west. The mountains are very old and often very high, the scenery in places being extremely grand. In the east, various conical peaks, known as the Mourne Mountains, are the remains of ancient volcanoes. North of these extends the plateau of Antrim, composed of hardened lava, which has formed pillars of rock

is situated Moville, a calling place for vessels from Glasgow to America. The Donegal Mountains, west of the Foyle valley, are composed of hard, crumpled



Fig 103 —North-east Ireland.

rock, crossed by rapid streams, making the scenery of the district exceedingly wild but grand. The coast, also, is rocky, on account of the mountains extending to the sea.

In Connaught the belt of mountains is continued as the Nephin Beg Mountains and the Mountains of Connemara. Here, again, the peaks are rocky and bare, and the valleys often hoggy, though the district is drained by such rivers as the Erne and Moy. Perhaps the most beautiful feature is the series of lakes contained in the valleys. The Upper and Lower Erne occur in the course of the River Erne, and at the foot of the Western Mountains are Lough Conn, Lough Mask, Lough Corrib.

In some cases the sea, entering the wide valleys which separate the mountain ranges, has formed beautiful openings like Donegal Bay, Sligo Bay, Blacksod Bay, and Clew Bay. The Mullet is a piece of land almost detached from the mainland, and a little farther south is Achil Island.

The mountains and valleys afford grand scenery, but they contain few minerals. In Antrim the rock is used for the roads, and Donegal and Connaught supply a quantity of granite and marble.

The inhabitants are engaged in fishing along the streams and on the coast, but the rich farm lands of the wide valleys occupy a larger number. The railways afford valuable service in removing the produce. The natives of Connemara are exceedingly poor, as there are few minerals, and no manufactures, while farming is hampered by the hoggy nature of the soil.

In Ulster the linen trade is of extreme importance, the flax of the hill slopes being cleansed in the rivers, the waters of which are well suited for cleaning,

bleaching, and dyeing. Coal is sent from England and Scotland, there being only a small coalfield in Tyrone. This linen trade has caused the development of fairly large towns. Belfast, the capital of the north, and the centre of the linen trade, is a great railway centre and has large shipbuilding yards. Antrim, Newry, Carrickfergus, Coleraine, Armagh, and Londonderry are all noted for some branch of the linen industry.

The towns on the west coast, such as Donegal and Sligo, are fishing centres or market towns, being connected by rail with Belfast and Dublin. Tourists now frequently visit the west coast.

EXERCISES.

- 1 Name the chief industrial centres of the North of Ireland and the industries carried on.
- 2 Draw a map of the northern region of Ireland to show the position of the highlands and also mark the principal railway routes.
- 3 Measure the lengths of the river Bann and the river Foyle by a piece of thread and find the area of Lough Neagh by means of squared paper.

SOUTH IRELAND

The mountains extend from east to west in the South of Ireland, forming parallel ranges which cause the rivers to take parallel courses. In some parts the mountains are composed of igneous rock, which forms the granite of the Wicklow mountains, but in other places the rock is a hard, purple sandstone. The loftiest mountains are in the south west, where they are known as the Macgillycuddy

Reeks, the highest peak being Carran Tual. In this corner of Ireland the mountains form a series of ranges with long firths, such as Dingle Bay, Kenmare river, Bantry Bay, between them. From Valentia Island on the south side of Dingle Bay a telegraph cable starts for America. On the south coast is Cape Clear on an island of the same name. The "Fastnet" is a lighthouse used as a sighting station for American liners.

The name, Roaring Water Bay, gives some idea of the wildness of this south western coast. The mountain scenery is extremely grand, the most famous district being near the lakes of Killarney. The valleys drained by the rivers Bandon, Lee, Blackwater, and Suir, are useful for farming, and the estuaries formed by the rivers provide good harbours, such as Cork, Youghal, and Waterford.

The climate of the south west is more equable than that of any other part, and this, together with the abundance of rain, greatly assists agriculture. The beautiful green pastures account for the name "Emerald Isle," and the excellent grass nourishes the cattle which yield the milk for Irish butter. Potatoes are largely grown, because they need much moisture.

Many towns established themselves where rivers were crossed by roads, these being the best places for collecting the produce. Among such market towns are Carlow, Kilkenny, Tipperary.

Kilkenny is a cathedral town and Tipperary has

a famous jail Railways connect Dublin with Wicklow, Wexford, Waterford, Cork, and Limerick, using the gaps in the mountains to pass from one valley to another Limerick at the head of the Shannon estuary is a manufacturing and market town, containing cotton and lace mills, and tobacco factories Cork, the largest town in the south, has a cathedral, and Queenstown, on an island in Cork harbour, is a calling place for American liners, which take the mails on board

Kinsale, Youghal, Waterford, and Wexford ship the agricultural produce to Liverpool and Bristol Rosslare is the packet station for Fishguard, which makes a short route from London to Queenstown and the south of Ireland

Though agriculture and cattle breeding are the chief occupations, some mining is done among the mountains Coal is found in Kilkenny and Tipperary, but it is of poor quality Among the Slieve Bloom and Silver Mine mountains lead and zinc are mined, small amounts of silver being frequently found in the ores The mountains of Wicklow are the richest in minerals, including lead, silver, and zinc, while granite is quarried

EXERCISES

- 1 Draw a map of the South of Ireland marking the height of the ground, the chief rivers and the principal railway routes
- 2 Where are Valentia, Fastnet, Tuscar Rock, Vale of Arklow Tipperary, Cove of Cork, Rosslare?
- 3 Name the ports of the South of Ireland With what places do they trade? What are the chief exports?
- 4 Describe the country around the lakes of Killarney

CENTRAL IRELAND

Between the two belts of mountains, a plain extends from the Irish Sea to the mountains of Connemara, touching the Atlantic beyond Galway. No range of hills occurs, and the surface is generally covered with clay, which causes numerous bogs. There are various lakes which the rivers drain to the Irish Sea or to the Atlantic, their slow movement making them useful for navigation. Communication was thus rendered easy for the early settlers, who made this the most important part of the country. Dublin, the capital, from which the roads and railways radiate, stands at the entrance to this plain.

The largest rivers on the east are the Fane, Boyne, and Liffey, and on the west the Erne and the Shannon with their tributaries. In these western river basins most of the lakes, such as Allen, Boffin, Ree, Derg, and the Upper and Lower Erne, have very irregular outlines. Two canals, the Royal and Grand, connect the Valley of the Shannon with the ports on the east.

The River Shannon rises in the hills on the north of the plain, and flows for some distance toward Sligo Bay before it turns south. The country is extremely flat, hence the river flows slowly, and the lakes are shallow. Between Lough Ree and Lough Derg the River Suck and the River Brosna join the River Shannon. Below Lough Derg, the Shannon has worn a passage through the mountains

to Limerick, where its large estuary begins. The Shannon is the longest river in the British Isles, and in places its scenery is exceedingly pretty. The basins of the rivers Boyne and Liffey are both



Fig. 104.—Region around Dublin.

interesting and beautiful, the quaint old towns and ruins giving some idea of the former inhabitants. The great Bog of Allen has been partially drained.

The coast towns like Dundalk and Drogheda are ports, and being opposite Liverpool, Fleetwood, and other English ports, do a good trade with the populous part of North England.

Dublin is a fine city with wide streets, and fine public buildings, including the university, cathedral, museum, and Government buildings. It contains the residence of the Lord Lieutenant or representative of the King. The industries include the making of poplins, and the brewing of beer.

Its position accounts for its importance, as it is opposite a populous part of Britain, the Cheshire Gate providing an easy entrance into England. Steamships sail regularly to Liverpool and Holyhead, from the landing station at Kingstown; Bray is a fashionable watering-place.

The railways across the plain connect Dublin with Limerick, Galway, and Sligo, and along the east coast they run northward to Dundalk and Belfast, and southward to Wicklow and Wexford. The most important line runs from Dublin to Cork. The chief difficulty met with in constructing the railways was the crossing of the great bogs.

Farming is the principal occupation, and many towns which have grown up along these lines provide markets for agricultural produce; but the manufacture of lace and poplins is carried on at some places.

Horse-breeding is of importance near Dublin, and *The Curragh* is used as a training ground for soldiers. Trim, Mullingar, Longford, Athlone, Roscommon,

and Tullamore are small market towns Galway, on the west, connected by rail with Dublin, has a university college It is not a large town, but it would make a good Atlantic port, if a trade route were established across Ireland from England to Canada and Newfoundland

EXERCISES

1. What are the principal means of communication between the east and west of Ireland?
2. Describe the course of the river Shannon and draw a map of the basin.
3. Dublin is the capital of Ireland What advantages has it over any other town for this position?
4. What are the occupations of the people in the plain of Ireland?

APPENDICES.

I—THE BRITISH EMPIRE

The British Isles contain an area of 120,000 square miles. Very often it is regarded as "the mother country" of the British Empire. This empire is the largest in the world in point of area, as it is more extensive even than that of Russia. It includes India, the whole of the continent of Australia, one third the continent of North America, and one fifth of Africa, in addition to possessions in South America.

British possessions in Europe are Gibraltar, which guards the entrance to the Mediterranean Sea, and Malta, an important calling place in the middle of that sea, while we have great interests in the Suez canal at the eastern end of the Mediterranean. The total area of this empire is nearly 14,000,000 square miles or over a hundred times the size of the British Isles themselves.

Although the British Empire extends over one-fifth of the total land area of the globe, the various parts are very scattered, so much so, that we often say "The sun never sets on our king's dominions."

Some parts lie on the south side of the globe, some in the far east, and when it is night in some of our lands it is noon in others. The people of

Australia are having their evening at the same time that the people of London are beginning the day, and the lands of British North America are covered with snow when the heat of the sun is scorching the crops and cracking the ground in Australia.

The distances to some parts of our Empire are as follows —

New Zealand	13000	miles	passage	40	days
Hong Kong	10100	"	"	38	"
Melbourne	10000	,	,	34	"
Calcutta	8000	"	"	23	"
Capetown	6000	"	"	16	"
Jamaica	4500	"	"	15	"
Quebec	2800	"	"	7	"

The scattered nature of our empire, and the fact that all types of climate are being experienced at any given time, makes it possible to provide food such as meat, wheat, and fruits throughout the year. To do this, regular sailings are established between all parts of the empire, and thus we have the largest number of vessels carrying produce to and from distant parts of the empire.

To carry the products to the ports before shipment to England, railways have been built, some of these crossing whole continents, traversing forests and deserts, spanning rivers or boring through huge mountain chains. Nearly 100,000 miles of railways are now laid in the British Empire.

In order to communicate quickly with all parts of the empire, telegraph cables have been laid which, in a few minutes, can carry the news of events in Australia to England. The immense distance between the parts makes it advisable for these parts to govern themselves, the acts they pass being approved before they become law, by a Governor sent out from the *mother country*.

The total population of the British Empire is 430,000,000 people, which is a greater number than has ever previously been known under one king. These people do not all speak English; they are not all white people, and by far the greater number are Mohammedans living in India.

British possessions may be classed as follows —

Colonies—Self-governing, as Australia and South Africa,

Colonies—Crown, such as Jamaica and Guiana.

Dependencies, such as India.

Forts, such as Gibraltar.

Victualling and coaling stations, as Singapore, Malta.

Trade centres, as Hong Kong and Lagos.

Protectorates, as Bechuanaland.

II.—PLACE-NAMES.

The origin of place-names should have some attention in every text-book of geography, as they illustrate the history of the locality, and, before locomotion became so common, gave us some insight into the origin of the inhabitants. Although people have travelled much over the country in later times, the names of the physical features are almost always the names given by the original occupants.

When the Romans drove the Celts to the north and west they gave Roman names to the districts they themselves occupied, while the Celts gave names to their new homes. Below are examples of some of these Celtic names:—

Moel or Mal—*A hill*—as in Moel Siabod, Malvern.

Pen—*A mountain*—as in Inkpen, Penmaen, Penrith.

Sculr—*A point*—for example, Scuir of Eigg (Skye).

Ben—*hill*—as Ben More, Ben Wyvis.

Dun or Dum—*A hill-fort*—as Dunkerry, Dunblane, Dumbarton.

Cairn—*Stones*—as Cairntoul, Cairngorm, Carrantual.

Brae—*Rough ground*—for example, Braemar, Braes.

Aber—*Mouth*—Aberystwyth, Aberdare.

Esk—*Water*—Eskdale, Esk, Exc, Usk, Ouse (Usque).

Avon—*Water*—Avon, Don, Tone, Teign.

Burn—*Stream*—Bannockburn.

Strath—*A valley*—Strathmore, Strathclyde

Kill—*A cell*—Kilmarnock, Kildare

Ard—*High*—Ardnamurchan

Caer—*A fort*—Caermarthen, Carlisle, Cardiff

Tre—*A town*—Pentre, Trefrew

Craig—*A cliff*—Craigpatrick, Craigendoran

Ros—*A promontory*—Ardrossan, Rosslare

Loch or Lough—*All Scottish and Irish lakes.*

Muir—*The sea*—Kenmore, Morecambe

It will be noticed that these names are found among the hills and valleys of the north and west

The Danes brought various Scandinavian names, which are found chiefly in the north and west of England, in Scotland and the Isle of Man, as well as in coast towns. The mixture of Danish and Celtic names is interesting

Good examples of Danish influence are —

By—*A town*—Whitby, Grimsby, Kirkby

Ness—*Headland*—Buchan Ness, Furness

Fell—*A mountain*—Crossfell, Scawfell, Snaefell, Goatfell

Scaw—*A wood*—e.g., Scawfell

Force—*A waterfall*—as Stockgill Force, High Force

Ey—*An island*—as Orkney

Beck—*A brook*—as in Wansbeck, Holbeck, Troutbeck

Forth, Ford, Firth—*A part of the sea*—as Seaforth, Milford

Wick—*A bay*—found in Berwick, Wick.

Scar—*A rock*—as Scarborough, Scarsdale (probably scuir is another form)

Thorpe—*A village*—as Milnthorpe, Bishopsthorpe, Ravensthorpe

Gill—*A ravine*—e.g., Stockgill, Ravensgill

Borg—*A fort*—a type is Borgue

Holm—*An island*—Langholm, Holmfirth

The Scandinavian and Celtic names are in quite different districts from those occupied by the Romans, whose place names were military in origin or allied to the Roman religion. Few are found far from the south east of England, a fact which helps to fix the area of the Roman occupation.

Castra—*A camp*—is found as cister and chester, in such names as Manchester, Winchester, Gloucester, Worcester, Chester, Lancaster, Doncaster, Leicester, Colchester

Colonia—*A military settlement*—as in Lincoln, Colne

Pons—*A bridge*—as Pontefract, Pontesbury, Pontypool, Pontypridd

Portus—*A harbour*—as Portsmouth, Portsea, Southport.

Strata—*A road*—as in Stratford, Stratfield, Streatham

Minster—*A church*—Westminster

Monk—*A monk*—Monkland, Monkton, Monkston, Monkswearmouth.

Abb—*An abbey*—Abbotsford, St Abb's Head

The Anglo-Saxon names are more widely diffused

than the Roman, and in some instances have displaced Roman names, owing to the Saxons having become the more numerous part of the population

Ton—*A town*—as in Bridgton, Stockton, Brighton

Weald—*A woodland*—as Weald of Kent, Waltham

Shaw—*A wood*—as Crawshaw, Audenshaw, Shaw

Field—*A clearing*—as in Sheffield, Driffield, Petersfield.

Ford—*A ford*—for example, Crayford, Dartford, Oxford.

Tod—*A fox*—found in Todmorden, Todkeld

Woden—*A god*—as Wanstead, Wednesbury.

Botl—*A dwelling*—as Newbottle, Bootle

From this list we can trace the origin of the names of a vast number of rivers, mountains, plains, and valleys. Towns are more recent, but still show traces of the earliest settlements on their present sites. Many root words have been altered, and in some cases it is almost impossible to find the origin, but the study is of great assistance to our history.

The names of people are not now so correct a guide as formerly, owing to the ease of travel, and to the fact that within reasonable limits our government allows people of other countries to become nationalised as British citizens.

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